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# USSR Report

MILITARY AFFAIRS

FOREIGN MILITARY REVIEW

No 8, AUGUST 1986

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22 JANUARY 1987

USSR REPORT  
MILITARY AFFAIRS  
FOREIGN MILITARY REVIEW

No 8, August 1986

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## FOREIGN MILITARY REVIEW

### JAPAN'S MILITARY DOCTRINE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 3-9

[Article by Col V. Rodin; "Japan's Military Doctrine"]

[Text] In recent years, Japan, the chief military and political ally of the United States in the Asian Pacific region, has significantly intensified its efforts in the military arena. Japanese powers openly espouse a course of achieving military strength commensurate with the state's economic potential.

Official government publications and statements by representatives of political and military circles carefully conceal real doctrinal positions. In making military preparations, which have in their makeup an aggressive, revanchist trend, Japan's ruling circles camouflage their activities by falsifying previously accepted laws, the demagogic displays of the "peaceloving" nature of Japanese policy, and the "exclusively defensive aims of military measures," etc.

In formulating and developing Japan's military doctrine, as well as in building its armed forces, foreign specialists and singled out three stages.

THE FIRST STAGE (1950-1957) is characterized by the violation of Article 9 of the Japanese constitution which firmly renounces "war for all time" and "the threat or use of armed force as a means of solving international disputes," and by the creation of armed forces and the official acceptance of "A Basic Policy in the Field of Defense."

The "Basic Policy" laid down the first long-term guidelines, since the defeat of the Japanese militarists during the Second World War, to prepare the country and its armed forces for war. However, this document was of a rather general nature and contains a lot of words on the role and the place of the United Nations in questions dealing with maintaining the peace. The developers of this policy tried to have it contain guidelines which would be beneficial to military forces and which would come into effect during a protracted period of time, particularly to overcome the anti-war sentiments of the population for the sake of "increasing patriotism" and creating a stable economic foundation; by strengthening the country economically, national military strength is built up; by making an all-out effort to strengthen military

cooperation with the U.S., which is looked upon as the "main guarantee of Japan's security," until it is able to achieve its own powerful military potential.

Thus, as emphasized in the foreign press, the first stage of the formulation of Japan's military doctrine was characterized by developing only individual doctrinal guidelines, definitely influenced by American military doctrine. In accordance with these guidelines, practical measures were also undertaken, particularly in organizing the armed forces.

In the SECOND STAGE (1958-1976), the Japanese military and political leadership focused their primary attention on improving the Japanese-American "security system" and building up the country's armed forces.

In 1960, the "Agreement of Mutual Cooperation and Security" was signed with the U.S., the majority of articles, which were composed in a demagogic spirit, were concerned with maintaining peace in the region and repulsing an external attack. In fact, the Pentagon obtained the right to use its army, navy and air forces on Japanese territory and materiel support.

The contents of the articles of the agreement completely corresponded to the objectives outlined in the "Basic Policy in the Field of Defense:" the U.S. guaranteed the "security" of Japan and enabled the military and political leadership to maintain a moderate pace of building up the armed forces and to focus primary efforts on creating the basis to rapidly develop a military and economic potential. The organization of the armed forces of Japan began to be carried out on a planned basis.

As a result of completing four armed forces development plans, by 1976, the number of regular personnel had been increased nearly three-fold and had reached 262,000, including 180,000 in the ground forces, 43,000 in the air forces, and 39,000 in the navy, and also, a permanent reserve had been created numbering up to 40,000. In the ground forces, 13 divisions had been deployed, including 1 mechanized, 3 brigades (composite, airborne assault, and tank). Their weapons included more than 700 tanks, 2,800 field artillery pieces and mortars, and 440 army aviation aircraft and helicopters. In the air forces there were more than 600 combat and auxiliary aircraft, and in the navy, 150 combatants and ships and more than 120 patrol and ASW aircraft. Expenditures in 1976 comprised 1,524 trillion yen, that is, more than a ten-fold increase over 1958 (149 billion yen), the first year of the first stage of military development. Units and formations were equipped with indigenously developed weapons and military equipment (except for individual types of missiles and aviation equipment), which approached the Western European models in their tactical-technical characteristics.

By the mid 1970s, Japan had available the most powerful armed forces among the capitalist states of the Far East and Southeast Asia and had organized military production and had established extensive RTD&E.

The accretion of a military potential demanded concrete definition of the separate positions for the "Basic Course in the Area of Defense." There were precise views on the character of a future war in the "White Paper on the

Defense of Japan" (1970). For example, the possibility of the emergence of a missile-nuclear war was admitted, but, at the same time, "the solution of a conflict with conventional weapons" was assumed. It was emphasized that "modern wars have a limited character." A local war takes shape as "an armed conflict of local significance." At the end of the 70s, the concept of "independent defense" was officially suggested, in which the importance of preserving the Japanese-American "security system" was emphasized and, simultaneously, the necessity for building up national military power from the perspective of the widest support for existing forces, was pointed out.

The ruling circles' propaganda for the "independent defense" concept, and also the practical measures being carried out in the early 1970s for the further build up of the armed forces, brought sharp criticism both inside the country and abroad. The opposition accused the ruling liberal-democratic party of a violation of the constitution's anti-war position and criticized the exorbitant growth of military expenditures. At the same time in the countries of Southeast Asia and the Far East, a campaign was begun against the rebirth of militarism in Japan.

Under such conditions, the Japanese leadership was forced to formulate its approach to the military question more precisely. As the development of the "Basic Course in the Area of Defense" was worked out, in 1976, the Japanese government adopted the so-called "Program for National Defense," which supported several official views in the area of military development. Additionally, in it the purposes and missions of Japan's military policies were set out, the "necessity and legality" for existing Japanese armed forces were substantiated, an estimate of the armed conflicts in the world and in the Far East, in particular those for which Japan had to be prepared, was given, the role and significance of the Japanese-American "security" system was emphasized, and also the structure, size and composition of the peacetime Japanese armed forces were listed, and the main directions for their development were given.

Thus, by the mid 70s, Japanese military doctrine was thoroughly developed and had taken on specific forms.

THE POLITICAL ASPECT of the doctrine recognizes the presence of the strategic balance between the East and the West, but, at the same time, does not exclude the possibility of armed conflicts (including the use of nuclear weapons) between two opposing systems. It focuses Japan on being ready to repulse "possible aggression" in a close union with the United States, and has in mind as the likely enemy the Soviet Union and the other socialist states. The task of providing for the deployment of U.S. armed forces in the Pacific Ocean and on Japanese territory, and also their protection during combat operations is entrusted to the Japanese armed forces.

The doctrine's MILITARY-TECHNICAL aspect envisions, stemming from Japan's role in the "Security Treaty" being withdrawn, the creation and support in wartime of so-called "based defensive forces," which should organizationally comprise the three branches of the armed forces and have the composition: 13 ground forces divisions, 430 combat aircraft, 16 submarines, 60 major class combatants, and 220 naval aviation aircraft and helicopters.



Their qualitative improvement, by means of the technical reequipping, by preserving the size and composition within the framework of established limits, was determined by the primary direction of the armed forces' development. At the same time, the requirement arose that the peacetime army, in case of necessity, would be able serve as a basis for the development of large-scale armed forces, and in this connection, the necessity to take measures to train reserves of command cadres and technical specialists was pointed out.

In the area of armament, a mission was assigned on the basis of the development of the country's military-economic potential, to complete the technical outfitting of the armed forces up to the level of a modern leading army, and to conduct RTD&E for these purposes with the help of the scientific and technical achievements of both Japanese and foreign scientists.

To maintain the troops (forces) at a high degree of combat readiness, the requirement was advanced to develop a system for collecting and processing reconnaissance information, as well as a unified communications and control system to provide effective guidance to formations and units under peacetime and wartime conditions. Simultaneously, the necessity was emphasized to develop a rear service system for creating stocks of weapons and material-technical resources, and comprehensive operational facilities for the country's territory.

A significant feature of the "National Defense Program" of 1976 was the fact that it took into consideration the possibility of a further increase in the size and composition of the peacetime armed forces and envisioned conditions which could produce such a necessity. In particular, the preservation of the armed forces within the framework of established limits was carried out independent of the status and development of Japan's allied relations with the United States, the development trends of Soviet-American, Sino-Soviet, and Sino-American relations, and also of complex situation on the Korean peninsula. In advancing these conditions, the Japanese leadership virtually guaranteed itself the possibility, under any far-fetched pretext (for example, using the thesis concerning the increase of the "Soviet military threat"), to untie its hands on the road of rapid militarization of the country.

Japan's military-political leadership constantly emphasized the "defensive" character of the "program" and, with reference to the fact that the doctrine is not envisioned for the creation and adoption into the arsenal of offensive types of weapons, i.e., ballistic missiles, strategic bombers, etc. For propaganda purposes, the moment that the bomb sights and the equipment for in-flight refueling were removed from the Japanese F-4 aircraft, in order that they could be used only in an air defense role, was accentuated separately. In 1976, the cabinet of ministers proclaimed a course for complete rejection of the export of weapons and also confirmed Japan's devotion to the three non-nuclear principles: not to have, not to produce and not to import a nuclear weapon. It was continuously emphasized that Japanese troops will not be sent to conduct military operations beyond the limits of their own territory. As it is believed, concerning the defensive character of the militaristic preparations, the cabinet of minister's decision in 1976, had to be evidence

concerning the freezing, for an unstated period, of the annual expenditures at a level of one per cent of the GNP.

However, foreign specialists, in analyzing the factors restraining the rate of growth of Japanese military potential, note that not one of them has the force of law, and is only an obligation taken voluntarily and which, at any moment, it is possible to repudiate. More than that, each of these obligations was surrounded by appropriate reservations and allows arbitrary interpretation. Evaluating the "Program for National Defense" of 1976 as a whole, they envision it, on the one hand, as a political maneuver, directed at mollifying the criticism of the Japanese leadership's military policy inside the country and abroad, and on the other hand, as an interim stage in the qualitative improvement of the national armed forces, the development of military production and R&D, the creation of conditions which would have provided, in case the appropriate political decision were taken, a change in the course for the rapid militarization of the state.

The adoption abroad in the 1980s of the concept of a "combined guarantee of national security" as Japan's official course in 1980, signified the approach of the THIRD STAGE in the formation of the military doctrine. The purpose of this concept consisted of strengthening the state's political influence in the region and in the world, bringing it into accord with its economic potential by the combined use of political, diplomatic and economic resources, and above all, a substantial activation of efforts in the military field.

The realization of the "combined guarantee of national security" concept envisioned the introduction of essential changes in the content of Japan's military doctrine.

On the basis of an evaluation of the development trends of the current international situation, Japan's military doctrine will yield the following classification of wars.

According to social and political content, these are wars between states of opposing social systems, civil and national-liberation, and also wars brought about by territorial controversies, racial motives, etc. By their scales, they are subdivided into general (dземmen), limited (gentey), and local (kekuti) wars. Japan's military doctrine divides them, according to the way they are conducted, into two types: wars using weapons of mass destruction and conventional.

Under conditions of parity between the USSR and the U.S. in strategic nuclear arms, and also in connection with the development of precision weapons, much attention is being paid to military operations employing only conventional types of weapons and in a protracted (dzikyusen) war. Japan's leadership, when determining the ways of conducting war envision also the combination of military and non-military (diplomatic, economic, and ideological) resources for achieving their political goals by the least expenditures of the country's resources.

Western countries uniquely find themselves allies of Japan (according to Prime Minister Nakasone's statement, "A common destiny unites Japan with Western

countries). Thus, the United States appears as the principal ally. Japan's ruling circles, while striving to increase the country's role, are trying to realize the planned course by "an increased investment in the West's strategic security and by strengthening the state's role within the framework of the Japanese-American security system."

The first step in this direction was the signing of the so-called Reagan-Suzuki communique during the Japanese prime minister's visit to the U.S. in May, 1981. Suzuki obligated himself to participate in "securing peace and stabilization in the region and to increase the contribution in the business of improving the defensive capabilities of the sea and air space around Japan." Additionally, he announced the readiness of the "self-defense forces" to defend the sea lines of communications out to 1,000 miles from the Japanese Islands.

During subsequent discussions between Prime Minister Nakasone and President Reagan (1983-1985), the Japanese side supplemented the obligation it had taken and announced the readiness, jointly with U.S. armed forces, to blockade the main strait zones of the Sea of Japan, and also to make available additional bases on Japanese territory for the deployment of American "forward-based forces."

Taking into account the nature of the "threat," as Japanese military doctrine defines it, the presence of the "treaty on security," and also in analyzing the experience of national and joint Japanese-American exercises, foreign specialists believe that it is most likely that Japan will take part in a general war against the Soviet Union and its allies as part of a coalition of governments which include the U.S. and the other NATO countries. As reported in the Japanese press, during the exercises, new variants for conducting war with conventional weapons were worked out. At the same time, the possibility of the belligerents using weapons of mass destruction was not excluded. In particular, in 1985, Prime Minister Nakasone made the following announcement in parliament: "Joint operations of the Japanese Navy and U.S. Navy ships with nuclear weapons onboard, under conditions of extreme circumstances for Japan, do not contradict the three nuclear-free principles... The government does not exclude the possibility of the use of nuclear weapons in this case, if other resources are rendered ineffective."

As reported in the Japanese newspaper AKAKHATA, since the beginning of the 1980s, the military departments of the two countries have been busy with detailed development of various war scenarios in the Far East, in accordance with which the execution of the following missions has been made the responsibility of the armed forces of the Japanese-American coalition: not to allow a break through of enemy fleet and air forces into the Pacific Ocean; to repulse strikes on forces, military and military-industrial targets, from sea and air; to defeat landings by sea and air, and, in case a landing is accomplished, to destroy the forces landing on Japanese territory. Recently, during national and joint exercises, development of missions was begun to attain superiority at sea and in the air by forestalling the enemy in deployment and by delivering strikes on his airfields and fleet force basing points, and also by the destruction of ship formations located in the open sea.

The working out by the "self defense forces" of offensive combat operations and the delivery of preventive strikes testify that a qualitatively-new moment has emerged in Japan's military doctrine, which, until recently, was officially defined as purely defensive. The possibility of delivering forestalling strikes on enemy targets in support of "defense" was openly stated, for the first time, in the "White Paper on the Defense of Japan"(1983). For purposes of demonstration of the "competentness" of such operations, representatives of the war department usually cite the announcement of former Prime Minister Hatoyami, made in 1956: "I do not think that the constitution recommends that we sit with our hands folded and await a catastrophe, when an assault has been carried out, using guided projectiles, on our territory (or such a threat exists). Therefore, the delivery of strikes on enemy bases, if there is no other way to avert the threat, will be considered a lawful act." It is again confirmed that elements of an aggressive character in Japan's military doctrine have always existed, however, by force of the political motives, they have not appeared in open form for a long time.

The course to the close cooperation of the "self-defense forces" and the American militarists is accompanied by the development of the main conditions of the conception of "independent defense," which envision the further expansion of the "zone of responsibility," and also a broadening of the sphere of missions being executed independently by the Japanese armed forces. Thus, Prime Minister Nakasone, in an interview in the American newspaper THE WASHINGTON POST, in January 1983, formed, in the following way, the Japanese armed forces' missions: "It is necessary to turn the whole Japanese archipelago into an unsinkable aircraft carrier, in order that the following missions can be executed: to become an insurmountable barrier in the path of Soviet bombers in the Pacific Ocean, to insure complete superiority in the four strait zones of the Japanese Islands, in order to prevent the passage of Soviet submarines; additionally, it is necessary to provide for the defense of the sea and air space to a distance of several hundreds of miles from the coast, and also the defense of the sea lines of communications on the Guam--Tokyo and Taiwan Strait axes.

Military construction is being organized and measures for the preparation of the country for war are being carried out in accordance with the opinions on the character of a war in which Japan may participate, its obligations within the framework of the allied agreements with the U.S., and also the missions assigned the "self-defense forces."

The development of the Japanese armed forces is being carried out on the basis of the 1976 conception of "based forces," in accordance with which they comprise three types, ground forces, air forces and a navy, totaling 270,000 regular forces (ground forces, 180,000; air forces, more than 46,000; and the navy, more than 45,000). In accordance with the opinions on the armed forces' missions, the tendency toward the primary development of the air forces and the navy has been emphasized. Thus, if, during the last ten years the size of the regular forces in the ground forces has remained nearly unchanged, then the number air force personnel has increased by 12 per cent, and in the navy by 7 per cent. Military appropriations for the ground forces during that period grew by a factor of 1.9 (from 651 to 1,144 billion yen), and for the air forces and the navy, by a factor of 2.3. In this connection, the air

forces and navy share of the military appropriations in the military budget has increased from 20 to 29.6 per cent and from 19 to 26.3 per cent respectively

At the same time, the ground forces remain the largest branch of the armed forces. They are made up of 13 divisions (including tanks), and 3 separate brigades, 2 infantry and an airborne brigade. Weaponry comprises over 1,000 tanks, more than 2,500 weapons and mortars, and over 400 army aviation aircraft and helicopters. The troops are equipped with means for defense and also special equipment for conducting combat operations when weapons of mass destruction are being used.

For the purpose of improving the ground forces' combat capabilities, it is planned, by the end of the 80s, to start equipping them with shore-to-ship types of missiles, essentially to update the tank park; increase the number 155- and 203.2-mm self-propelled howitzers; create anti-tank helicopter subunits equipped with anti-tank guided missiles; begin delivery of infantry fighting vehicles to units, and to increase the air defense capability by saturating forces with short-range air defense batteries.

In the plans to build the armed forces, special attention is being paid to improving the combat capabilities of the air forces and the navy. Thus, by this time, in the air force inventory, there are approximately 700 combat and auxiliary aircraft, including 50 F-15 and 6 air defense groups, containing 180 HAWK batteries. By the end of the 80s, it is projected to triple the number of F-15 aircraft, equip bomber aviation with air-to-ship missiles, begin rearming air defense subunits with PATRIOT-Class air defense batteries, modernize the automated BEYDGE air defense force and resource control system.

In Japan's navy there are more than 160 combatants and auxiliary ships, and also up to 200 aircraft and helicopters. By the end of the 80s, with little increase in the composition of the fleet's ships and aircraft, it is envisioned to significantly increase their fire power by equipping surface ships and submarines with missiles and quintuple the number of shore-based patrol aircraft (reach up to 75 units), having equipped the latter with anti-ship missiles.

In the plans for increasing military construction, military-type research and development is being stimulated more and more. The subject matter of work being conducted is embracing all the basic trends of weapon and military equipment development. Thus, in 1985, models of an infantry weapon, a cruise missile, an anti-tank missile, a medium tank, an infantry fighting vehicle, a tactical fighter, an ASW helicopter, new classes of ships, and various radio electronic equipment were found in the stage of completion or active development. Work is being conducted intensely to develop powerful missile carriers, and also research in the area of nuclear energy is being carried out by civilian organizations.

As a result of the agreement signed between the Japanese government and the American administration to place Japanese technology at the disposal of the United States, a legal basis was created for joint development of new types of weapons, including those for realizing the American "Star Wars" program.

The operational equipping of the country's territory, which is being carried out in support of both the "self-defense forces" and the U.S. armed forces, is being implemented in accordance with the doctrinal views. It includes measures to develop a network of aviation and sea bases, POL and ammunition depots, forces control points, and an improvement in the transport network. Foreign specialists emphasize that the Japanese Islands have a level of operational equipment which is quite high. Thus, the airfield network includes more than 100 fields, the greater part of which can be used to base modern types of combat aircraft. The American Air Force and Navy constantly use more than 10 air bases.

Five military air bases were developed to base the Japanese Air Force (Yokosuka, Sasebo, Maizuru, Kure, and Ominato). Additionally, fleet forces can use several dozens of ports on the country's eastern and western coasts. The U.S. Navy uses the bases at Yokosuka, Sasebo and Naha continuously. The bases' and ports' technical equipment permits the repair of the main ship types, including aircraft carriers.

There are POL, weapon, and ammunition depots on the majority of the islands. Recently, the question of increasing depot stocks, primarily in the northern part of the country, including for the support of U.S. armed forces, is being studied.

A unified control system, to provide instructions to the armed forces, has been created which includes control organs which are combined by a diversified network of various types of communications. In 1984, a central armed forces command post (CP) was put into operation in Tokyo. It provides forces control for all branches of the armed forces. It is linked with the armed forces' unified communications system, the forces control system, and air defense and fleet resources. Additionally, the CP has direct communications with state institutions and the U.S. armed forces command in Japan.

A concentrated automobile (roughly 1 million km) and railroad (28,000 km) network has been developed in the country. This ensures the delivery of freight to forces in any region of the country both within the boundaries of each of the four islands, and between the other islands which are tied together with bridges and tunnels. In crises situations, the department of national defense can use civilian shipping for military transport.

The military doctrine considers the preservation of the capitalist regime in Japan, and the whole world, as the main goal and makes a contribution to the general strengthening of the West by weakening or "rejecting" the world socialist system. On its basis, a course has been taken for the preparation, together with the U.S. and the Western countries, for a world war against the USSR and the other socialist countries.

Overall, the military doctrine of modern Japan has a clearly expressed class character, is aggressive in its essence, has an anti-Soviet, anti-socialist direction. This is indicated by the union with international imperialism, the idea of revanchism in foreign policy, and also the main directions of military development.

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## FOREIGN MILITARY REVIEW

### IMPERIALISM: MILITARY-SPACE PARTNERSHIP

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 9-14

[Article by S. Shumilin, Candidate for Economic Sciences; "Imperialism: Military-Space Partnership"]

[Text] Reactionary forces, joined in the U.S. military-industrial complex, are not abandoning attempts to hinder the humanitarian movement of relaxing international tension. In trying to stop the onward march of history and accomplish imperialism's class goals, primarily America's, these forces are trying to strengthen all levels of Washington's military preparations, aimed at siezing domineering positions in the world. As such, the big wigs of the U.S. military-industrial complex attach primary importance to implementing the "Star Wars" program, proposed by President R. Reagan in 1983, or as it is officially called at the Pentagon, the "Strategic Defense Initiative (SDI)".

This program, the official hypocritical name of which only camouflages its aggressive nature, has the goal of protecting the United States with a "shield" comprised of a wide-scale antimissile defense system having space-based components, thus giving them the capability to deliver with impunity the first nuclear strike against the Soviet Union.(1) The Pentagon is sparing no efforts to achieve this goal. Enormous resources are being allotted to implement SDI. For example, according to information in the March edition of the journal, INTERNATIONAL DEFENSE REVIEW, it is planned to allocate 4.8 billion dollars to the Pentagon in FY-87 alone, approximately 75 per cent more than in the preceeding year, and in 1988, it is planned to increase the appropriations to 6.3 billion dollars for these purposes. More and more American firms and scientific-research organizations are, for the first time, being enlisted to work on the program. According to foreign press reports, more than 260 companies and laboratories were participating in SDI by the beginning of 1986. The military mechanism, intended for carrying out "Star Wars", is being developed and tuned up: a joint U.S. Armed Forces Space Command was organized on the basis of the Air Force and Navy Space Commands and began to operate on 23 September, 1985: a joint space operations control center is under construction near Colorado Springs. The issue regarding the formation of a military space force is being considered. In spite of the past assurances by the American leadership concerning the non-nuclear nature of the antimissile defense system, being developed within the scope of the Strategic



Defense Initiative, tests of nuclear devices for pumping X-ray lasers are being carried out, which, as is known, are an important component of this system.

Having chosen the course toward the militarization of space, fatal both for the U.S. and for all of mankind, Washington is trying to rally other countries behind it, above all, the leading NATO partners and also Japan, Australia, and Israel. As the Western press reports, approximately two dozen foreign governments were "given the honour" of being officially invited to participate in SDI.

The U.S. must not be the only one on the path to "Star Wars." In the American military-political leadership's opinion, this is an indisputable requirement and item for the program's success. Such a great interest by Washington in enlisting the partners to carry out SDI is easily explained. First, it is considered, that even the semblance of "wide approval" of SDI by the allies, not even to mention its actual presence, helps successfully to sell the program to public opinion in the United States. Second, the White House and the Pentagon unconditionally want their activities, aimed at undermining Soviet-American strategic arms limitation agreements, to be concealed by a certain similarity to the West's system of "collective responsibility". Finally, the mercenary interest of the "Star Wars" initiators include using the partners' scientific-technical potential in the best way for themselves. It is well known, that several U.S. allied powers have achieved marked successes in solving a number of large-scale scientific-technical problems. In particular, a case in point, is the successful work in Great Britain to develop fifth-generation computers, computer program support, military purpose control systems, synthetic aperture radars, missile technology (The Edinburgh University Harriet-Yoto, the firms British Aerospace, Marconi, Plessey, Systems Designers, Software Science and others; in the FRG, tracking satellites for ground targets, radar and laser technology (in particular, lasers intended for destroying missiles in terminal flight phase), optical sensors, mirrors and reflectors, superlight materials (the firms Dornier, Leitz, Messerschmidt-Belkov-Bluem, Zeiss, etc.); in Japan, electro-optical devices, lasers, fiber-optics (including new-in-principle missile control systems), robotics, coatings which absorb radiowaves and make coated objects "invisible" to radars (Mitsubishi, Nippon Telegraph and Telephone, Sumitomo Electric Industries, TDK, Hitachi). The U.S. considers the results of these and several other activities, being carried out abroad, to be important both for the successful implementation of SDI, and for strengthening its own positions in the capitalistic world market.

Washington employed an extensive propaganda campaign for the purpose of enlisting the partners in the program. Immediately after the publication of the president's SDI directive at the beginning of 1984, representatives of the right-wing administration were sent to the capitals of United States allies in Western Europe and the Pacific for the purpose of acquainting the partner countries' leaderships with the program and clarifying its main aspects. In the same year, 1984, high-ranking U.S. officials held a meeting with the NATO leadership concerning SDI problems. American politicians and military personnel, including Pentagon Chief C. Weinberger and the leader of the organization included in this department responsible for implementing the

"Strategic Defense Initiative," J. Abrahamson, are still conducting discussions with the allies concerning their possible participation in SDI.

In all such discussions and meetings, the partners were earnestly persuaded using various means. They intimidated them with the mythical "Soviet military threat" and convinced them that the "Star Wars" program will help block this threat. Thus, the program is presented in an alluring "defensive" wrapping, making it, as they believe in Washington, "morally justified." The belief is widely held that SDI is only an "answer" to the supposedly similar work being carried out in the Soviet Union to develop a space-based antimissile defense.

In referring to the program's present enormous scales and the prospect of their rapid growth in the future (it is considered that for the period from 1984 to 1993 alone, SDI will absorb more than 70 billion dollars; over all, as they believe, the issue concerns the expenditures, reaching from 500 billion to 1.5-2 trillion dollars), they are promising the allies a large economic gain from participation in it, not only directly, but indirectly, in the form of "similar results" from the work, suitable for use in non-military spheres of the economy. These promises are reinforced by the arguments, that at its basis, SDI hardly embodies a program of basic research, but that the ideas, put forth in it and already in effect, in a majority of instances, are sufficiently universal to be used in both the military and in the civilian sector. As a result, according to the U.S. administration's assertions, apart from ideas, technical systems and materials which may be used for non-military commercial purposes, will "result" from the program. Such directions in SDI, as the development of communication and control systems, lasers, optical instruments and devices, fifth-generation computers, new materials, and robotics are especially mentioned as prospects in this regard. It is emphasized, that "economic wars" along these directions, will be carried out in the West into the 21st Century and those governments, which are ready and able to engage in the research in the given directions, will have the right to claim an important advantage within the the civilian production markets' competitive plans.

The intense "brain-washing" of their potential clients by Pentagon bosses is yielding the results desired by Washington. Official circles in a number of countries, acting in the narrow economic interests of the national-military industrial complexes and demonstrating allied solidarity with the United States, are speaking of joint activities with in the U.S. in SDI issues and are recklessly being drawn into a dangerous space adventure.

Primarily, it was Great Britain's leadership, which was the first to give approval for its country's participation in the program. In December, 1985, a corresponding "memorandum of cooperation" was signed between the U.S. and Great Britain, and in February, 1986, there were a series of agreements for its development. The terms of the English firms' participation in this program, formulated in these documents, are kept in strict secret. However, according to the reports of the newspaper GUARDIAN, it became known, that the U.S. Defense Department is planning to subject the given firms to a thorough check and to hush up their work, which can be used in the "Star Wars" preparation program. Although similar steps are being undertaken according to U.S. legislation, the question is the nature of imposing the actions of

American laws on Great Britain. As they report, in London they display the concern for possible political scandals in connection with such violations of the country's sovereignty. But no more than that.

Work on the program is unfolding in Great Britain in many directions (in the "memorandum of cooperation" referred to, 18 areas were identified in which English technology could be useful for SDI). With the goal of coordinating these activities, a special department was also created in the British Ministry of Defense.

SDI also found high ranking admirers in the FRG. The Bonn leadership not only affirmed "political support" of the program, but followed Great Britain's example in concluding an intergovernment agreement with the United States to enlist West Germany in the work to militarize space (U.S. Secretary of Defense, C. Weinberger, and FRG Economic Minister, M. Bangemann signed it in Washington in March 1986). Moreover, FRG Defense Minister, M. Worner, called upon West European countries which are members of NATO, to join efforts and supplement the American "Star Wars" plans with a program to develop a combined air defense and antimissile defense system for Western Europe, the so-called European Defense Initiative (EDI). In Bonn, they consider that this program, conceived of as an adjunct of SDI, but less ambitious in comparison with it regarding the objectives and means of its achievement (to a limited extent, in the initial stage), serves in its own right as an intermediate stage on the course to the implementation of the entire "Strategic Defense Initiative" complex and is more acceptable for several wavering allies, than the American "Star Wars" scenario. But in any case, through EDI, they will be tied to SDI. Thus, Bonn is not only participating in the latter, but is taking upon itself improper role of its expediter in Western Europe.

Japan expressed its "understanding" of the Reagan "Strategic Defense Initiative". It has not yet reached an official government decision to tie the country to the American plan to militarize space. However, the first concrete steps to actual participation in SDI have already been made. For example, the firm Hitashi Magnetics supplied powerful magnets for combat lasers being developed in one of the Los Alamos scientific centers. A protocol was signed (28 December 1985) concerning the transfer of production technology to the United States for a "surface-to-air" missile guidance system based on the new principle of inputting information on the general target type into the computer memory. As they assert, the search and guidance system, being developed on this principle, provides high accuracy for target destruction and, with only slight modification, can be used for the purpose of developing weapons for "Star Wars".

Such support is a logical extension of the Ya. Nakasone cabinet's entire policy, directed at strengthening the military, including the military-economic, collaboration with the U.S. Lately, with Prime Minister Nakasone's arrival to power, the Country of the Rising Sun is actively helping to forge weapons abroad by its deliveries of military products. For example, according to information from the newspaper, THE WASHINGTON POST, 80 per cent of the silicon components now used in complex American military equipment are of Japanese origin. It is obvious, that under these conditions, the official participation of Japan in SDI, which Washington is soliciting, will promote

its rapid transformation into one of the U.S.'s main contractors under the leadership of General Abrahamson.

The Italian government gave a "green light" to the participation of national industrial companies in SDI. This decision was reached in the spring of this year at a conference of a special intra-ministerial committee, headed by the President of the Council of Ministers, B. Kraksi.

Government support of SDI is being enjoyed in Tel Aviv, which officially joined the program in May, 1986. In this case, the question is not merely concerned with the usual coordination of military efforts for the strategic allies (the U.S. and Israel). The Israeli press emphasizes that Israel expects to assert its military superiority over Arab countries for a long time and to develop a simple guarantee for accomplishing its territorial ambitions by means of participation in implementing the "Star Wars" project. "Tel Aviv's participation in the program (SDI-U.S.)", writes the Jordanian newspaper Al RAI, "further intensifies its refusal to take any steps aimed at achieving progress in establishing true peace in the region."

However, according to a number of foreign military specialists' opinions, even with such successes of the United States, to speak out concerning the simple adoption of SDI by the American allies, serves to turn the Pentagon's wishes into reality. The understanding of this indisputable truth is emerging in many countries allied to the U.S., that SDI is not advantageous to any one from either a military, or a political point of view. The program's military aspect especially summons great doubts in the allies. The point here, as they figure, is that it would be absurd to rely on the development of an antimissile defense system within the limits of SDI, which is adequately effective in respect to the intercept of ballistic missiles (especially on relatively short flight paths). A number of other types of nuclear weapons and their delivery means (for example, cruise missiles) are outside the limits of this systems influence. As a result, the American allies are apprehensive, that the antimissile defense system "shield" being developed within the framework of SDI, will extend only over U.S. territory. "Reagan thinks primarily about the North American continent, and the security requirements of Western Europeans are not his problem," the West German journal SPIEGAL wrote regarding this. French experts, in summarizing all the "pros" and "cons" to the given side of the issue, come to the conclusion: "the military advantages (SDI-U.S.) for Europe are zero. We are not convinced for a minute, that it will be feasible" In turn, Great Britain's Minister of Foreign Affairs, J. Hay, compared the "Star Wars" concept with the French attempt to insure its own security before the Second World War by means of constructing the "Maginot Line," implying that, as with the latter, the new "irreproachable defensive line" will in fact turn out to be the same catastrophic failure.

It is also important to note, that many U.S. partners realize all the more clearly; the SDI concept is by no means defensive, but is for the development of an additional component of the U.S.'s offensive potential. The program's defensive intent is fiction, as is the assertion that SDI is a reaction to similar plans existing in the Soviet Union to conduct military operations in space. The understanding of this fact is growing; that the implementation of

the SDI program clearly contradicts the ideas of maintaining the strategic balance of forces in the world.

The participation in SDI stirs up, in the allies, great anxiety for their political independence and security in the military-economic realm. It is evident, that in employing its military industry in the plans for the militarization of space, the U.S. partners place this realm, to a great extent, under American control, closely attach it to the American "death industry," and place new levers of influence for its political policy into U.S. hands.

Economic arguments in favor of participation in SDI are unconvincing to many. According to a number of Western experts' opinion, although Washington is glad to involve the allies in the preparations for "star wars" and is really ready to give them part of the orders for the program, this will yield dividends to only a narrow circle of military-industrial companies involved in the military-space business, and by no means compensates for the participant countries' loss for "the transfer of intellect" to the U.S. and also from the diversion of resources from the civilian RDT&E realm.

In addition, the hopes for the by-product results of SDI, for its high "commercial potential" are highly doubtful. First, the nature of the program provides the basis for these doubts. It is all the more obvious that research within its limits will be advantageously applied, having the purpose of developing models, prototyped weapons, military equipment, and also their subsequent non-laboratory developments and trials. As the organ WIRTSCHAFTSWOCHE of FRG business circles, writes, the U.S. Defense Department's conversion, by FY-84, of all designs connected with SDI, and others, from the category of RTD&E 6/1 "Research" in which basic research prevails, to the 6/2 category of "Experimental Development" and 6/3 "Design Work", testifies to the applied nature of SDI. This feature of SDI essentially limits the commercial potential of the ideas arising during its development.

It also pointed out that specific technical equipment, developed within the limits of SDI, does not bear appreciable uses being developed for the civilian sphere. This is evident, above all, with the specification of requirements, laying claim to the consumer characteristics of these articles, which will be developed during the implementation of the program. Many Western experts consider that the given requirements in a majority of cases either completely preclude the use of SDI "products" in civilian realms, or makes it possible only with series modifications of the developed items, requiring large expenditures (in particular, this relates to control systems being developed within the limits of SDI, which, as the Western press asserts, in principle can be adapted for the control of air traffic, automobile service, factories, and flexible industrial systems, etc. But, even if these articles could be directly used in the non-military spheres without any modification, they are more often non-competitive because of the high cost, stipulated by the high and usually redundant requirements to their quality for the given realms. In connection with these, the West German newspaper FRANKFURTER ALLGEMEINE wrote, that the technical innovations for civilian industry, being developed directly in its realms, are ten times cheaper than the same innovations "originating" from military work. For this, they consider the number of researchers and

official persons in the West, and the entire practice of carrying out and patenting the results of military RTD&E in the U.S. refutes the principle of the growing degree of the "coincidental use" for new technology (in particular, space technology) in the civilian and military spheres, extensively proclaimed by the Pentagon. For example, studies from the FRG by I. Eisbach and R. Rieling, show that of 328 patents, resulting from the NASA research program through 1963, only 16 per cent had "commercial potential." According to the poll results of a large number of representatives from American military-industrial firms, only approximately one tenth of all the inventions, which were made by these firms in connection with fulfilling military orders, were used commercially. At the same time, of the general number of patents issued in the U.S., the commercial use is on the average approximately one-half.

However, according to many Western experts' opinions, if even it were assumed that the principle which is pointed out works, (although in concept, the possibility of such "potential use" grows), an opponent can suggest that the American government lift the restrictions, imposed due to "national security" considerations, and authorize the transfer of SDI results to the U.S. civilian economic sphere, not to mention foreign governments. The impracticability of a similar kind of supposition is being directly affirmed by statements of responsible American persons. For example, R. Perle, Assistant Defense Secretary, figures that the program's results will not have separate parts, and thus, access to them will be extremely limited. The practice of embargo, to which the U.S. administration repeatedly has resorted in past years, raises large doubts on its account.

But all these waverings, as life shows, will not hinder Washington too much in harnessing the partners to a military-space team. As is known, several U.S. allied countries, not accepting the cock-and-bull on the "space shield" seriously, are clearly able to avert a nuclear war and officially decline from cooperating with the United States on an intergovernment level in SDI work. Australia and Greece indeed showed a decisive "No" to participation in the American plans to militarize space. Other allies are taking both sides of the issue. For example, France, as President F. Mitterand recently reaffirmed, is officially against participation in the U.S. military space program. At the same time, highly influential forces in the country are placing a great deal of freedom in the hands of national military-industrial firms and research organizations in this area. And Prime Minister, J. Chirac already announced, that France must not stay on the side lines in SDI research, which he approves in the military plan.

All this shows, that the U.S. military-space partnership with foreign countries is acquiring a totally practical shape. The apologists of "Star Wars" have never once clearly justified it; the socialist countries are faced with the highly dangerous threatening expansion of imperialist forces' collective activities into new spheres of the arms race. Imperialism is resorting to the use of its "joint military power" in space, and it is the duty of peace-loving peoples to stop it.

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(1) For more details on SDI, see "Zarubezhnoye voyennoye obozreniye," 1986, No. 4, pp. 5-9, ed.

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## FOREIGN MILITARY REVIEW

### ISRAELI MERKAVA TANK

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 20-23

[Article by Col E. Viktorov; "The Israeli MERKAVA Tank"]

[Text] The political/military leadership of Israel, carrying out an openly expansionistic policy, devotes substantial attention to equipping its forces with the latest models of weapons and combat material, especially tanks.

Until 1980, the Israeli Army had tanks developed and produced in other countries. Several of these vehicles, for example the American M48 and the British CENTURIAN, were modernized to improve their combat capabilities and to a large degree, for the purpose of adapting them to the specific geographic conditions and the peculiarities of combat in that region. But even these tanks did not fully satisfy the Israeli Army's requirements. Therefore, in the early 1970s, the Israeli government approved a program for national development of the MERKAVA tank.

Many Israeli firms participated in the design and production of this tank. Also, foreign specialists and firms were involved. It became apparent from the beginning that Israeli industry could not provide the cast and rolled armor plate, other details, engines, transmissions and many structural elements and equipment. As reported in the foreign press, much help in tank development and production was provided by the United States which, in particular, in the initial stages, established credit in the amount of 120 million dollars.

Production of the MERKAVA tank (see figure) began in 1979. It is noted that up to 30 per cent of the tank's structural elements come from abroad. American engines and transmissions, along with 105-mm rifled guns (manufactured under an American license), and the fire control system of Israeli production, are delivered to the factories where the hull and turret are assembled.

In accordance with requirements, the main efforts of the MERKAVA developers were directed at giving it maximum survivability and crew protection. As a result of this, the tank is heavy (60 tons) in comparison with comparable Western models, and has a unique design. For protection of the crew, the engine and transmission are placed in the forward section of the hull and serve thereby as additional shielding against rounds striking the frontal



composite armor, which is severely angled. Also, such a positioning of engine and transmission, as Israeli specialists note, permitted freeing a substantial armored volume within the tank for additional ammunition. In case of necessity, up to 10 infantrymen or wounded could be transported in this compartment in place of ammunition. The tank (Figure 1) has a length of 7.45 m (8.65 m including the cannon in a forward position), a width of 3.7 m and a correspondingly low profile, 2.65 m to the roof of the top of the turret. The sharp shape of the welded turret and the use of composite armor make it more invulnerable to enemy fire.

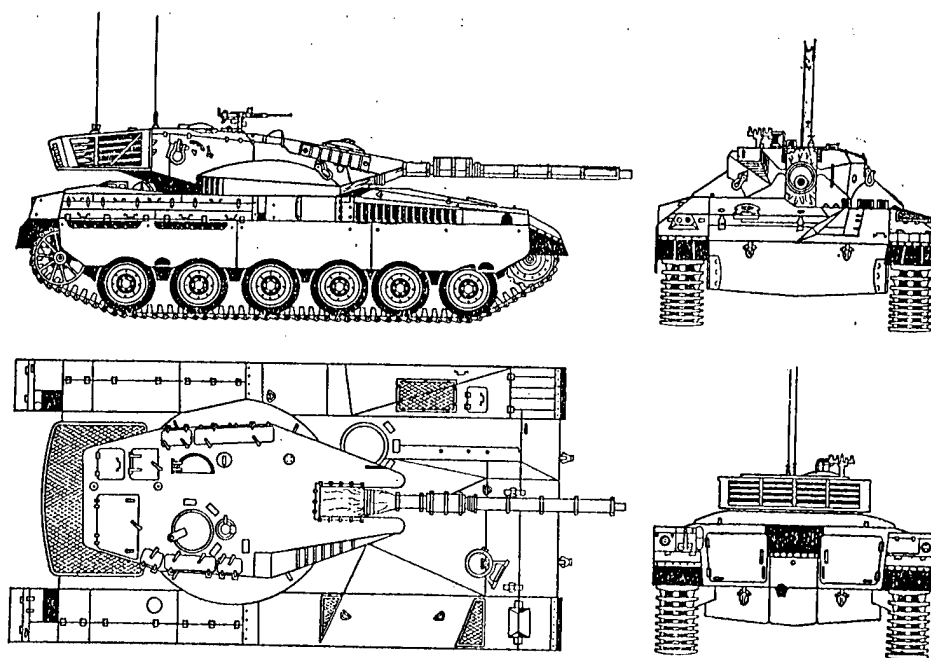


Figure 1. Projection of the MERKAVA Tank

MERKAVAS were first used in the Israeli aggression in Lebanon in 1982. In foreign experts' opinion, they demonstrated great combat effectiveness including crew protection, whose losses were very small compared with crew losses in other types of tanks. It was noted that, to a certain extent, this was attributable to the presence on the MERKAVA of a modern rapid-action halon gas 1301 fire extinguisher, and also the possibility for the crew of a damaged tank to escape through a door in the rear of the hull. Israeli specialists believe that, compared to escape through top hatches, use of this door will reduce losses from small arms and, in contrast to evacuation through hatches in the floor of the hull, will reduce the probability of burns from burning fuel spilled on the deck.

Evaluating the experience gained in using the MERKAVA in combat in 1983, Israeli industry began putting out a modernized MERKAVA MK2 which varied from the proceeding base model (about 250 of these were produced) in increased armor protection, increased mobility and fire power.

As reported in the foreign press, improved composite armor was employed in the MK2 in which armor spacing is filled with diesel fuel. In Israeli specialists' opinion, this will significantly reduce the effectiveness of shaped charge warheads. The upper part of the sides of the hull has internal (principal) and external (supplemental) armor plates. An air cleaner, a ventilator filter, instruments and spare parts are located on a platform over the tracks. Improved side shields have been introduced which, in contrast to the previous versions, do not restrict the mobility and agility of the tanks. This is planned to become the base for the so-called active armor with explosive elements which substantially reduce the effectiveness of shaped charge warheads. Earlier, as revealed in the Western press, "active" armor in the form of supplemental box-shaped attachments on top of the basic armor plates on the hull and turrets of M48 and M60 tanks performed well in battles during the Israeli aggression in Lebanon. Metal chains with balls are hung on the lower part of the rear of the turret around its perimeter. They serve as an anti-shaped charge screen and are designed to reduce damage from shaped charges and ATGMs by activating the warheads before they strike the main armor.

Much attention has been given also to improving protection against antitank mines. Contributing to this are the arched shaped of the bottom, the position of the driver behind the engine and transmission compartment and placement of elements of supply of the unit outside the hull.

The MK2's firepower is provided by the M68 105-mm rifled cannon, manufactured in Israel under American license. It is stabilized in two planes during movement. Drives are electro-hydraulic. It has a sufficient depression angle to conduct fire from defilade. To raise the accuracy and stability of fire in variable outside air temperatures, a three section insulated cover was developed. The combat load is 62 rounds with high explosive, shaped charge, kinetic energy, and smoke warheads. The effectiveness of the Israeli-developed armor in defeating a subcaliber fin-stabilized M111 round, with discarding sabot, is noted. Its rod is made from heavy metal and, according to declarations by Israeli military observers, at a range of up to 2,000 m, it can penetrate 150 mm of armor at 60° inclination. Cannon ammunition is stored in fire-retarding containers - four rounds per container.

A 7.62-mm machinegun is coaxial with the main gun. The commander and loader each have such a machine gun mounted on brackets next to their hatches. Additionally, a 60-mm grenade launcher can be mounted on the turret for smoke, flares and anti-personnel fragmentation grenades. It is believed that use of the fragmentation grenades permits carrying a larger number of anti-armor rounds.

The gunner is located to the right of the main gun. His position is equipped with a fire direction panel, a combined laser (of yttrium-aluminum garnet of neodymium) periscope and range finder (one and eight power), ballistic computer, and a periscope observation device. The possibility of adding a thermal sight is also envisioned.

The commander, located behind and higher than the gunner, has panorama sight (4 and 20 power) and six vision blocks around the hatch perimeter. The

commander's sight is connected with the gunner's rangefinder sight, as a result of which he can pass on his latest aiming instructions, and when necessary fire the main gun in place of the gunner.

The loader, located to the left of the gun, uses one revolving periscope device which is mounted on the turret roof near the hatch.

The driver gets to the driver's compartment through a hatch or the combat compartment. In the hatch there are three periscope vision blocks, of which the middle one may be converted to a passive night vision device. The MK2 uses the American AVDS-1790-5A diesel engine (900 hp) and the Allison CD-850-6B hydromechanical transmission, delivering a maximum road speed of 58 kph, and a 500 km range. On each side of the tank are six pairs of road wheels with a diameter of 790 mm and 210 mm of travel and three supporting rollers. Drive wheels are located forward. There is an independent spring suspension. The two forward wheels have hydraulic shock absorbers. The suspension can be replaced quickly if it is damaged by a mine. The tracks (width 640 mm, length across the wheels 4.52 m) are all metal, with open hinges. The tank can overcome the following obstacles: a 30° slope, 3 meter trench, 1 m vertical obstacle, a 1.4-m deep ford (without preparation).

According to reports in the foreign press, Israeli industry has began development of a further improved model of this tank, the MERKAVA MK3, which, in contrast to the preceding models, will have a 120-mm smooth bore gun with automatic fire control, a multifuel 1,200 hp engine, new transmission and hydraulic suspension. It is noted that automatic loading is not planned. As before, the tank crew will consist of four men. They intend to strengthen the upper part of the hull and turret. Production of the MK3 is planned to begin in the 90s.

Overall, as foreign military experts believe, the MERKAVA's introduction into the armament of the Israeli Army will permit substantial increases in combat capabilities.

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## FOREIGN MILITARY REVIEW

### SAUDI ARABIAN AIR FORCE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 29-37

[Article by Col V. Zabolotnyy; "The Saudi Arabian Air Force"]

[Text] In carrying out a policy directed at further strengthening its leadership position in the Arab World, above all in the Persian Gulf region, and also in activating its operations against progressive forces in the region, Saudi Arabia's monarchist regime continues to build up the power of all armed forces branches. In considering the air force as one of the most mobile and effective components of its military machine, the country's leadership is paying special attention to its development. With this goal, a large number of new aviation equipment and weapons is being purchased, the combat training of units and subunits improved, and organizational and other measures implemented. As the foreign press emphasizes, all this is being accomplished primarily with the direct participation and help of the U.S., and also of several other Western governments that are members of the aggressive NATO bloc.

The missions, organization, combat make-up, air defense system, basing, combat training and future developments of Saudi Arabia's Air Force are expanded on below, based on information published in the foreign press.

MISSIONS, ORGANIZATION AND COMBAT MAKE-UP. The Air Force is called upon to execute the following missions; the protection of oil producing regions, administrative centers and military targets from air strikes; direct air support of the ground troops and navy; aerial reconnaissance; the transport of personnel and equipment, and also material-technical support resources for troop combat activities; and special operations.

For executing these missions, the Air Force includes; fighter (air defense), fighter-bomber and military transport aviation, and also various purpose helicopter subunits.

Fighter aviation numbers four fighter-interceptor squadrons. One of them is equipped with the older LIGHTNING English aircraft (the 2nd Fighter Squadron, 20 LIGHTNING F-53s and five LIGHTNING T-55s at Tabuk air base). Three squadrons are equipped with the newer modified American F-15 EAGLE (including

# SAUDI ARABIAN AIR FORCE COMPOSITION

SQUADRONS			PERMANENT BASING LOCATION (AIR BASES)	NUMBER AND TYPE OF AIRCRAFT AND HELICOPTERS
DESIGNATION	QUANTITY	NUMBER		
Fighter	4	2	Tabuk	20 LIGHTNING F-53s
		5	Al-Taif	5 LIGHTNING T-55s
		13	Dhahran	45 F-15C, 15 F-15 D(i)
		.	Khamis-Mushayt	
Fighter-Bomber	6	3	Al-Taif	22 F-5E and F
		10	Al-Taif	22 F-5E and F
		15	Dhahran	18 F-5E, 9 F-5F
		7(2)	Dhahran	Approximately 40 F-5E, F and B
		9(3)		
		11(3)	Al-Riyadh	More than 40 BAC-167 STRIKEMASTER
Military-Transport	3	4	Al-Riyadh	Approximately 50 C-130 B and H
		16	Jiddah	8 KC-130
		1(4)	Al-Riyadh	1 Boeing 747, 1 Boeing 707, 2 C-140, 1 AB-206, 2 AS-61
Helicopter	3	12	Al-Taif	24 AB-205, 16 AB-206
		14	Khamis-Mushayt(5)	10 AB-212, 3 SH-3D
		.	.(6)	24 SA-365 with AS-15TT Antiship missiles
Training	1	8	Al-Riyadh	Approximately 20 Cessna 172s

1. Two F-15 aircraft were acquired to replace losses.
2. Combat-training subunit. Executes crew training missions for the combat employment of weapons.
3. Combat-training squadrons. If necessary, they can be enlisted for combat operations as ground-attack aircraft.
4. Special purpose squadron. Transports members of the royal family, the country's highest leadership and high-ranking foreign visitors.
5. An AB-212 helicopter subunit, equipped to conduct search and rescue operations, is located at this airbase.
6. Antiship squadron, operating in the Navy's interests. Its subunits are dispersed to airfields located near coast lines of the Persian Gulf and the Red Sea.

the 5th and 13th Fighter Squadrons; 45 F-15C and 15 F-15D aircraft at Al-Taif, Dhahran, and Khamis Mushayt airbases respectively).

Six aviation squadrons comprise fighter-bomber aviation; the 3rd, 10th, 15th, 7th, 9th, and 11th. The first four are equipped with American F-5E and F TIGER-2 tactical fighters. In all, there are approximately 100 aircraft in them, including several older F-5B combat-training aircraft. The 3rd and 10th Fighter-Bomber Squadrons are located at Al-Taif Air Base and the 15th and 7th at Dhahran (the latter trains personnel in the combat use of onboard aircraft weapons).

The 9th and the 11th Fighter-Bomber Squadrons are equipped with the English BAC-167 STRIKEMASTER combat-training aircraft. (More than 40 aircraft at Al-Riyadh Air Base). During peacetime, these squadrons conduct flight training (primary and advanced training) for Air Force Academy students. In wartime the mission of rendering direct air support to the ground troops is entrusted to them.

There are two squadrons (the 4th and 16th) of HERCULES aircraft in military transport aviation, in which there are approximately 50 C-130E and H transport aircraft and eight KC-130 tanker aircraft (located at Al-Riyadh and Jiddah Air Bases) and also one special transport squadron of aircraft and helicopters, intended for transporting members of the royal family, the country's highest leadership, and high-ranking foreign visitors.

There are two special-purpose helicopter squadrons (the 12th and 14th) in Saudi Arabia's Air Force for executing a number of additional missions; part of them are used for transporting personnel and cargo, and some for executing search and rescue operations, etc. In addition, there is one squadron of SA-365 helicopters, armed with AS-15TT antiship missiles for combating surface targets. They are operationally subordinated to and operationally support the navy.

In all, as the foreign press testifies, Saudi Arabia's Air Force numbers more than 200 combat, 62 transport, and approximately 20 combat-training aircraft, and more than 80 helicopters. The number of personnel exceeds 14,000 men (a more detailed combat make-up of the country's air force is presented in the table).

THE AIR DEFENSE SYSTEM. Besides fighter aviation, there are 14 IMPROVED HAWK antiaircraft guided missile (ZUR) batteries (108 fire units), 24 modernized CROTALE surface-to-air missile systems (ZRK), and a significant number of small-caliber antiaircraft artillery and transportable ZRK among the ground forces personnel and equipment for executing air defense missions. The following were established to control active air defense forces: one command post (Al-Riyadh Air Base), five control and warning centers (TSUPO) of the air defense sectors (Dhahran, Al-Taif, Tabuk, Khamis Mushayt, and Al-Kharj), and several independent radar sites. They are all equipped with radars, and information processing and transmission systems.

A U.S. Air Force detachment (four E-3 AWACS aircraft and three EC-135 tanker aircraft), located at Al-Riyadh Air Base, according to a bilateral agreement

and capable of carrying out round-the-clock E-3 combat patrol for an extended time, is used for the purpose of creating a continuous radar field, especially for detecting low-flying targets.

A significant number of Saudi Arabian Air Force specialists comprise the E-3 aircraft crews and radar site teams, along with American servicemen. For this squadron's subsequent operations, it is planned to send five aircraft, purchased in the U.S. to a corresponding designation subunit and train their crews as they arrive.

According to foreign press reports, it is planned to transfer all air defense personnel and equipment to the operational subordination of a special air defense command being formed.

BASING. Besides the main airbases mentioned above, which are equipped with modern radio-technical equipment, and also other ground-based flight support equipment, there are hard surface runways (VPP) having a length of more than 3,000 m. Air Force units and subunits use civil aviation airfields such as Turayf, Badanah, Sakakah, Hail, Buraydah, Al-Rass, Tampah and many others (Fig. 1).

A large portion of the airbases and airfields was built with U.S. help. Currently, judging by foreign press reports, the modernization of the airfield network is continuing. In particular, the construction of the largest airbase in the region, El-Kharj, is being carried out (60 km south of Al-Riyadh). It is planned to build there from five to seven runways having a length of 4,000 m, located five km from one another. Upon the completion of construction, the following will be located at it: the Air Force Academy (with subunits having training and combat-training aircraft); the 4th Air Transport Squadron (C-130 aircraft); a group of AWACS aircraft and KC-707 tanker aircraft serving them; the country's air defense control and warning center; logistic, technical service and repair units; and also several other Air Force subunits.

As the Western press notes, hardened aircraft shelters are being constructed at the main airbases. They are not single ones as in Western Europe (individual shelters for each aircraft), but group ones. Up to four aircraft can be accommodated in one compartment of such a shelter. They have large dimensions and are fully equipped with all that is necessary for servicing and preparing aircraft for flight, including the check of all systems, refueling, gun loading, and missile and bomb suspension, etc.

According to Western press evidence, there are twice as many spare assemblies, units, sets and separate items for the technical servicing and field repair of aviation equipment at the airbases, than NATO specifies. Reserves of material-technical equipment and ammunition, supporting the conduct of active combat operations by aviation subunits for 30 days are stored at airbases and dispersal airfields.

As a whole, according to Western military experts' assessments, Saudi Arabia's airfield network completely supports the dispersal of aircraft during a threat

period and the execution of the necessary maneuver of personnel and equipment during combat operations. Nevertheless, the country's air force command is

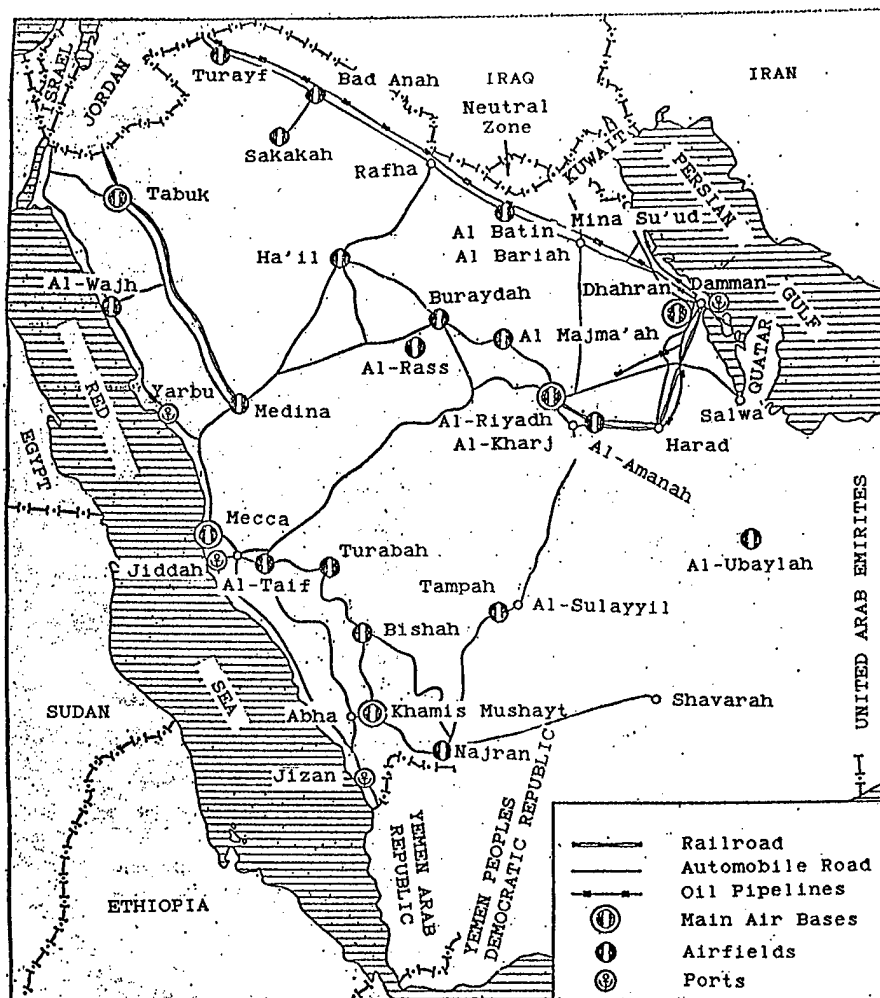


Figure 1. Schematic of the Location of the Principal air Bases and Military Airfields and Several Other Elements of the Saudi Arabian Air Force Infrastructure:  
proposing definite efforts for expanding its capabilities. In particular, as



the American journal AVIATION WEEK AND SPACE TECHNOLOGY reports, the country's air force conducted trials of the new French post-landing, rapid aircraft stopping system, the ATLAS aircraft arresting unit, which is relied on to support the landing of fighters having a landing weight up to 30 tons and landing speed up to 350 km/hr. During the trials, an F-15C fighter completed four landings using this arresting gear. The aircraft's landing weight equaled 18 tons, and the landing speed reached 205-250 km/hr.

The ATLAS system is mobile. It can be transported to an assigned airfield on a C-130 military transport aircraft or cargo aircraft and set-up in a new place within 30 minutes.

As foreign military specialists figure, the use of such aircraft arresting units allows the capability to disperse tactical aircraft to be noticeably increased. And small, undamaged portions of airfield runways can be used (in case of strikes against them) for a safe landing of its aircraft, returning after completing a combat mission.

PERSONNEL TRAINING. The largest in territory and the richest (due to the sale of oil) country in the region, Saudi Arabia has a population of 8 million people, although an overwhelming part of it is illiterate. Therefore, hundreds of thousands of foreigners work and serve in practically all branches of industry, in transportation and other spheres of activity where a definite educational and skill level is required.

This situation also affects the country's armed forces. For example, of the 52,500 servicemen in Saudi Arabia's regular armed forces, there are more than 10,000 of foreign citizenship. In addition, there are several thousand military advisors, instructors, experts and other specialists in the country, primarily from the U.S., but also from several Western European countries. Since the most complex equipment exists in the inventory of military aviation, a significant portion of the foreigners work in Air Force staffs, units and subunits. An overwhelming majority are Americans. The armed forces are formed on the principle of hired mercenaries. Males from 18-35 years of age are admitted into the service. The foreign press notes that the main difficulties arise in training personnel, who are first sent to the Air Force Academy, and then to U.S. training centers.

Volunteers from 18 to 24 years of age are admitted to the Air Force Academy. Besides the usual requirements to be in good health and equally well educated, still one other requirement is pushed--the candidates must obligatorily know the English language. Training lasts three years. During this time the students' flight time reaches 200 hours. Initial flight training is carried out on the CESSNA 172 aircraft (12 hours), and the main and higher training on the STRIKEMASTER BAC-167 aircraft (42 weeks, completing up to 150 flights, the average length of which is approximately 1.2 hours). Then the pilots are sent to the U.S. to master the F-5 aircraft and after the completion of this program, to combat units.

The foreign press notes, that during the training process a large number of students wash out. For example, 150 students are admitted to the academy each year. But after the beginning of flights on the BAC-167 aircraft (a flight

time of 15-17 hours), more that 50 per cent of the students are weeded out of the flying service. As a result, approximately 50 men advanced to flights on the F-5 aircraft, and approximately 40 complete this stage of training.

As the country's command figures, in order to fill the shortage of flight crews in combat units, it is necessary to turn out, as a minimum, twice the number of pilots. Such a situation is noted during the training of qualified engineer-technical personnel, especially specialists requiring solid theoretical training.

Because of this, the country's military leadership must hire foreigners. However, in the Air Force command's opinion, the participation of the latter, in practically all the air staff, unit and subunit spheres of activities, leads to specific difficulties, depriving them of complete independence. Therefore, the command is trying to replace the capabilities of foreign specialists with national cadres, especially in combat units. But, according to several of the country's military leadership representatives' assessment, this process is proceeding very slowly, although it has succeeded in achieving definite results. In particular, combat subunits, equipped with the F-5 aircraft, can actually function without enlisting American specialists, and, as a result, their number has noticeably decreased. However, in connection with the arrival of new aircraft (F-15) and weapon systems from the U.S, the number of this country's military advisors, instructors, and firm representatives grew significantly once again. According to the Air Force command, it will require many years to replace them with their own specialists.

COMBAT TRAINING is aimed at increasing the air force's combat capability. It is carried out in the form of daily training and various exercises, during which air force units and subunits work out the missions primarily inherent to them.

For example, fighter crews train in carrying out aerial combat, intercepting enemy aircraft at distant boundaries, and escorting strike groups. They simultaneously stand combat alert at airfields and in zones, and execute patrol flights along assigned flight routes. During daily training and especially during exercises, fighters are fairly often transferred to other airfields and complete their missions from them. At the same time, in air defense fighter squadrons, a great deal of attention is paid to training crews in delivering strikes on ground and sea targets. For example, F-15 fighters regularly carry out flights for the combat employment of air-to-ground weapons at special firing ranges. In considering this issue, the foreign press emphasizes that even "clean" LIGHTNING fighter-interceptors fairly often carry out bombing runs.

The crews of squadrons, equipped with F-5 tactical fighters, train in delivering strikes on ground (sea) targets using aerial bombs and guided weapons. As such, they work out various methods and ways to negotiate enemy air defenses, and, in particular, they execute flights in radio silence at low and very low altitudes, using EW, and also target search, approach and attack systems.

The foreign press emphasizes, that pilots of the single seat F-5E aircraft,

along with executing the main mission to an equal degree with the crews of F-15 and LIGHTNING fighters, learn to conduct aerial combat, escort strike groups, intercept enemy aircraft and stand combat alert for the country's air defense system. For example, at Dhahran Air Base, two F-15 and two F-5E fighters stand around-the-clock alert, ready for take-off in five minutes.

The crews of F-5F twin seat aircraft also have the mission to conduct combat with the air enemy. However, according to the air force command's views, their primary mission is to deliver strikes against ground targets, especially using air-to-ground guided weapons, in particular laser guided aerial bombs and the MAVERICK guided missile.

While carrying out various combat missions, F-5 tactical fighter crews quite frequently conduct in-flight refueling from KC-130 tanker aircraft.

According to exercise experience of the country's air force, the transfer of tactical fighters to dispersal airfields or forward basing points is accomplished by groups of aircraft. The composition of such a group includes 12-14 crews, which upon arrival at the assigned airfield, execute their own missions from it, completing on the average 35-40 sorties. Mixed combat groups are created for delivering strikes against ground targets. The normal composition of a group for it includes 8-12 strike variant F-5 aircraft and 4-6 F-15 escort fighters; and a minimum composition includes 4-6 F-5s and 2 F-15s.

Besides working out the missions mentioned above, the crews of combat subunits learn to conduct aerial reconnaissance to one degree or another. The pilots of the 3rd Fighter-Bomber Squadron are trained especially to execute this mission.

During daily training and especially in exercise periods, the command tries to create conditions, close to those in which subunits will be assigned to operate in the event of war. Consequently, they fly with high combat intensity. Regarding the latter, the foreign press reports that, during an exercise for a fairly short flying day, one of the squadrons, located at Al-Taif Air Base, completed 66 combat sorties using onboard weapons at the firing range.

On alert flights during combat watch, and also when working out air defense missions and rendering air support to the ground forces and navy under normal conditions, combat aviation units and subunits closely cooperate with the American E-3 AWACS aircraft mentioned above. In expounding on this issue, the foreign press emphasizes, that a greater number of specialists from Saudi Arabia's Air Force comprise both the ground organ units of this system and the E-3 aircraft crews.

On the average, each combat aircraft pilot has 20 hours of flying time per month and as a minimum and executes a live missile firing once a year. Western military experts note the fairly high training of Saudi Arabia's combat aviation pilots and ground unit personnel. For example, they emphasize that in participating in the U.S. Air Force exercises under the Red Flag program, this country's air force F-5E aircraft subunits successfully completed 135 flights

of the 140 planned. The remaining flights were not completed due to reasons other than those relating to Saudi Arabian Air Force pilots and engineer-technical personnel. They completed flight preparations and aircraft servicing with their own forces, and the back-up American specialists were obliged to remain inactive.

The country's military transport aviation subunits transport troops and cargo support all armed forces branches. In addition, they conduct airborne assault landings, evacuate sick and wounded, and also execute a number of other assigned missions. The average number of flight hours for each C-130 aircraft is 45 hours per month.

Air Force DEVELOPMENT is being carried out primarily by equipping it with new aviation equipment and weapons, modernizing existing aircraft, and improving the unit and subunit combat training system.

Regarding the first direction, the 60 F-15 fighters mentioned above; more than 2,400 MAVERICK air-to-ground guided missiles (for arming the F-5 fighter-bombers); a large number of SIDEWINDER air-to-air guided missiles; aerial bombs, including guided ones; and other equipment and weapons were acquired in past years in the U.S. In the future, Saudi Arabia was planning to purchase still a significant number of F-15 fighters in the U.S., including the strike variant, to replace the LIGHTNING fighters and create new aviation subunits. However, under the pressure of the pro-Israeli lobby, the American senate did not ratify the delivery of these aircraft. Then the country's leadership signed a contract with Great Britain for the delivery of the English-made TORNADO fighters and the HAWK light ground-attack aircraft.

In all, according to this contract (for a general sum of approximately 5 billion pounds sterling), the Saudi Arabian Air Force will receive 132 aircraft, of them: 48 TORNADO GR-1 fighter-bombers, 24 TORNADO F-2 fighter-interceptors, 30 HAWK ground attack aircraft and 30 PC-9 training aircraft (the latter are produced in Sweden; they will be delivered first to Great Britain, where several modifications will be put on them and new onboard equipment installed according to Saudi Arabian specifications).

Simultaneously, Great Britain is delivering weapons for the aircraft, in particular anti-radar and antiship missiles, concrete piercing munitions, and SKYFLASH air-to-air guided missiles with radar-homing guidance, etc.

The the contract also requires the supply of spare parts, personnel training, the repair and completion of complex types of work for technical aircraft servicing up to the end of their service life.

In addition, 5 E-3A AWACS aircraft, 6 KC-707 transport-tanker aircraft, 2 reequipped Boeing 707 EW aircraft, more than 1,000 AIM-9L SIDEWINDER air-to-air guided missiles and other weapons were ordered for the country's air force from the U.S. The delivery of this aviation equipment and weapons is planned to be completed by 1988.

Besides the E-3A aircraft mentioned above, 17 new three dimensional FPS-117 radars, which are set up at air force command posts, control and warning centers, and at individual radar sites, were purchased in the U.S. to modernize the air defense forces and resources control system. The communication system is being improved.

Simultaneously with the purchase of new equipment and weapons abroad, the country's air force command implemented and plans to carry out a number of measures to modernize the existing inventory of aircraft. In particular, it is planned to install laser gyroscopes on the F-5 fighters, which will allow the time to activate onboard navigation flight systems for flight readiness to be reduced from 2.5 minutes to 22 seconds. To expand the air force's capabilities to transport troops and cargo, five Boeing 707 commercial transport aircraft are being modified (large dimension hatches are being installed and the cabin floor is being strengthened).

The training programs are being reviewed within the plan to improve personnel combat training. It is planned to construct a large training center with two firing ranges, equipped with systems to objectively monitor pilot activities during all stages of flight during their work up for various combat missions. Other measures are being implemented.

As a whole, the Western press notes, that the country's air force command is directing great efforts at further increasing the combat efficiency and combat capabilities of all units and subunits. By the end of the 1980s, it is planned to have 225-250 of the most modern combat aircraft in the so-called first line.

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## FOREIGN MILITARY REVIEW

### AMERICAN F-16 FIGHTING FALCON TACTICAL FIGHTER

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 37-43

[Article by Col Yu. Alekseyev; "The American F-16 FIGHTING FALCON Tactical Fighter"]

[Text] The F-16's historical development dates from the period of the U.S.'s aggressive war in Vietnam. In trying some how to justify its results, the air force command, promoted the idea that a further increase in tactical aviation's power would be clearly impossible without the emergence of new fighter types, so-called heavy (expensive) and light (inexpensive) fighters. The development of the F-15 aircraft, representative of the first, was already underway at the beginning of the 1970s, and the development program for the second existed--the LWF (Lightweight Fighter). According to air force requirements, this aircraft had to be significantly lighter and less expensive than the F-15, with air superiority intended to be its primary mission.

In February, 1972, proposals for the development of a fighter under the LWF program were received from the leading American firms of General Dynamics, Northrop, Boeing, Vought, and Lockheed. In April of that same year, the General Dynamics and Northrop designs were selected for further competitive development. A contract for the development of aircraft prototypes were made with both firms, receiving the designation YF-16 and YF-17 respectively. A ten-month test program was conducted from February through November, 1974, at Edwards Air Force Base (California). In September, 1974, the Pentagon renamed the LWF program the ACF (Air Combat Fighter). In December, the air force command announced the YF-16 to be the competition winner, and a decision on its full-scale development was reached in January, 1975. In this same year, the F-16 aircraft was the winner in the competitive battle for the delivery of a new-generation fighter to the air forces of Belgium, Denmark, the Netherlands, and Norway for the purpose of replacing the aging F-104 STARFIGHTER aircraft. The F-16's competitor, the French MIRAGE F-1 fighter, was mercilessly cast aside under powerful pressure from the transatlantic partner, which so loves to talk about "NATO solidarity".

Judging by foreign press materials, General Dynamics developed four serial variants of the F-16 aircraft. The single-seat F-16A and the two-seat combat-trainer F-16B were produced initially, and the improved F-16C and D fighters

have been produced since 1984, respectively. All aircraft variants have identical main design elements. A description of the most contemporary F-16C aircraft, especially armament, and also the main differences of other F-16 variants is presented below (their tactical-technical characteristics are provided in Table 1).

TABLE 1

F-16 AIRCRAFT'S TACTICAL-TECHNICAL CHARACTERISTICS

CHARACTERISTICS	F-16A	F-16B	F-16C	F-16D	F-16/79A	F-16/79B	F-16XL
1	2	3	4	5	6	7	8
Takeoff weight (kg);							
Without external suspension (only with two SIDEWINDER guided missiles on the wing panels).....	11,090	10,850	11,370	11,100	11,810	11,540	.
Maximum.....	16,060	16,060	17,000	17,000	16,060	16,060	21,770
Empty aircraft weight, kg.....	7,360	7,670	7,600	7,900	8,090	8,360	.
Fuel reserves in internal tank kg.....	3,160	2,620	3,160	2,620	3,160	2,620	5,800
Maximum weight of external brackets, kg					4,310	4,310	6,800
Calculated flight weight with an overload factor of 9 (complete fuel reserve in internal tanks) kg.....	11,100	11,100	11,840	11,840	.	.	.
Flight speed, Mach:							
Maximum at high altitudes.....	>2	>2	>2	>2	2.06	2.06	>2
Maximum at sea level.....	1.2	1.2	1.2	1.2	>1	>1	.
Economical cruise.....	0.9	0.9	0.9	0.9	.	.	.

TABLE 1 (Continued)

## F-16 AIRCRAFT'S TACTICAL-TECHNICAL CHARACTERISTICS

CHARACTERISTICS	F-16A	F-16B	F-16C	F-16D	F-16/79A	F-16/79B	F-16XL
1	2	3	4	5	6	7	8
Service ceiling.....	18,000	18,000	18,000	18,000	15,000	15,000	.
Climb rate at sea level, m/sec...	315	315	315	315	115(1)	115(1)	.
Combat radius, Km:							
With air intercepts.....	>900	>900	680				.
Ground attack mission.....	550(2)	550(2)	800				>4600(3)
	965(4)		965(4)		490(5)		
Ferry Distance, Km.....	3,890	3,890	.	.			.
Max calculated positive overload-factor with a full fuel reserve in the internal tanks.....		9	9	9	9	9	9
Aircraft length, m.....	15.01	15.01	15.01	15.01	15.01	15.01	16.51
Wing span, m.....	9.45(6)	9.45(6)	9.45(6)	9.45(6)	9.45(6)	9.45(6)	10.43
Wing surface, m.....	27.9	27.9	27.9	27.9	27.9	27.9	61.6
Forward edge wing sweep angle, deg.....	40	40	40	40		40	50-70
Aircraft height, m.....	5.09	5.09	5.09	5.09	5.09	5.09	5.36
Length of take-off run, m.....	750	750	.	.			.
Length of landing run, m.....	750	750	.	.			.

1. Time to gain altitude 12,000 meters.
2. In a direct flight profile. Payload-6 500 pound Mk82 bombs, 2 AIM-9 SIDEWINDER MISSILES
3. Flight distance.
4. On optimum altitudes with two suspension fuel tankds with a capacity of 1,400 liters. Payload--2 2000-pound bombs, 2 AIM-9 SIDEWINDER guided-missiles.
5. With a direct line profile with two suspension fuel tanks with a capacity of 1,400 liters. Payload--6 Mk32 bombs and 2 AIM SIDEWINDER guided-missiles. Loiter time in target area 1 hour.
6. With the SIDEWINDER guided-missile launch unit on the ends of the wing panels.



The design features of the F-16C aircraft reflect numerous traditional approaches to this issue, characteristic of American fighters. It is designed as a monoplane with a mid-position delta type wing form lying in a plane. The wing panels are attached to the fuselage using fairings, which provide smoothness in aerodynamic forms, an increase in the lift force at large attack angles, a reduced wetting surface, and the capability to accommodate an additional fuel supply in tanks. All this provides the capability to increase the wing root's thickness giving increased rigidity, and, as American specialists assess, to reduce the structure's weight to approximately 110 kg. The wing's structural configuration includes 11 spars and 5 ribs. The upper and lower skins are made of one-piece sheets. The leading-edge flaps are controlled automatically, depending on the flight Mach number and the attack angle. The trailing-edge flaps have large flaperons with a maximum angular turn speed of 52 degrees per second. Aluminum alloys are used primarily in the wing construction.

The all-metal fuselage of semi-monocoque design has three main sections: the nose section (with the cockpit), the mid-section and the tail section. Vortex flow controls, with a large wing sweep, are used in the nose section, which increases the aircraft's lift force and directional stability at large attack angles. The multi-spar vertical stabilizer has a skin of graphite-epoxy composite materials. Various equipment, in particular, the radioelectronic countermeasures system or a breaking parachute, are accommodated in the elongated root fairing. The stabilizer's rotary cantilevers are interchangeable. Their skins are made of multi-layers graphite-epoxy composite materials and the mechanically attached to an corrugated aluminum reinforced structure.

The under-fuselage tail fins have an aluminum honeycomb structure and aluminum skin. Upper and lower air break flaps, controlling the hydraulics and inclined to 60 degrees, are located between the rear parts of the stabilizer's surfaces and the fuselage. The landing gear is tri-sectional. The nose section with a guided strut wheel is located behind the engine air intake, which decreases the risk of foreign objects falling into it while on the ground. When the aircraft's take-off weight is less than 11,340 kg, the pressure in the pneumatic wheels reaches 14.8 -15.5 kg/cm<sup>2</sup> (in the main ones) and 15.1-15.8 (in the nose wheel). An arrester hook for aircraft landing at airfields, equipped with breaking systems, is located under the fuselage tail section.

The power plant includes the Pratt and Whitney F100-PW-200 afterburning, double-circuit, turbo-jet engine (TRDD). In the future it is planned to use the more reliable General Electric F100-PW-220 or powerful F110-GE-100 engine. (Their characteristics are presented in Table 2). The air intake is irregular and a special flap is installed under the fuselage for bleeding the boundary layer. A gas turbine starter is used to turn on the engine. In case of an engine or power system failure, a supplementary emergency unit automatically operates, insuring the operations of the generator and the hydraulic pump.

The fuel supply (more than 3,000 liters) is contained in the wings and 5 fuselage tanks. In the two-seat aircraft variant, the fuel supply in the internal tanks is approximately 17 per cent less. Fuel tanks suspended on an under-fuselage and two outside underwing stations with a capacity of 1,136 and

1,400 liters, respectively, can be used to increase the fuel supply. The fighter is equipped with an air-to-air refueling system. The fuel receptacle is located in the upper part of the central fuselage section.

TABLE 2

MAIN ENGINE CHARACTERISTICS

CHARACTERISTICS	F100-PW-200(220)	F110-GE-100
Maximum thrust, kg		
Without afterburner	6,800	7750
With afterburner	11,300	13,150
Specific fuel expenditure, kg/kg.hr		
Without afterburner	.	0.66
With afterburner	.	2.01
Air expenditure, kg/sec .....	103	120
Total degree of pressure increase	25	30
Degree of double ducting	0.7	0.85
Gas temperatur ahead of the turbine.....	1,400	.
Weight, kg.....	1,370	.
Length x diameter, m.....	4.85 x1.18	4.6 x 1.18

The cockpit canopy is non-reinforced and the transparency made from polycarbon plastic. The catapult seat provides an emergency escape from the aircraft on the ground. It is inclined backwards to 30 degrees to facilitate the pilots transition to large g-loads.

The hydraulic system (two independent subsystems) with a 210 kg/cm<sup>2</sup> operating pressure insures the operation of the aircraft's control surface drives, the landing gear's retraction and release and other requirements. Generators with a power of 40 and 5 kW.A and four hermetically sealed storage batteries are the electric power source.

The decreased reserve of static stability (the thrust center is shifted rearward) is one of the elements of the concept of aerodynamic forces direct control used in the aircraft's aerodynamic configuration. This substantially reduced the trim drag, especially at supersonic speeds and large g-loads. However, this required the use of a highly reliable continuous operating system, having increased stability with four-fold redundancy, in addition to the aircraft's electronic control system.

The F-16C's onboard equipment includes, in particular, the Westinghouse AN/APG-68 multifunction pulse-Doppler radar; the Litton LN-39 inertial navigation system; an aerodynamic parameters computer; the AN/ARC-164 ultrashort wave radio (the AN/ARC-186 radio can also be installed); a flight control computer system; the AN/AIR-69 detection receiver; the AN/ARN-108 instrument landing system equipment and the AN/ARN-118 TACAN navigation system. Various pod-contained equipment, including the AN/AIQ-119 and AN/AIQ-131 ECM systems, a forward-looking IR system, and the PAVE PENNEY laser target designator, can be accommodated on an external suspension.

**AIRCRAFT ARMAMENT** The fighter is equipped with the built-in 20-mm, 6-barrel VULCAN cannon having a 515 round ammo supply. The following stations are available for various external suspensions, calculated with a load-factor of 5.5 (9) for various cargo: an under fuselage station -- 1,000 (540) kg; 2 inside under-wing stations -- to 2,040 (1,130) kg; 2 central under-wing stations --up to 1,590 (900) kg; and on the ends of the wing panels -- up to 190 (190) kg. In addition, along the walls of the air intake there is one station for suspending pod variants of various special equipment (electro-optical, a forward-looking IR system, etc.) which are calculated for a load of 410 and 250 kg with a load factor of 5.5 and 9 respectively. With the complete fueling of the internal fuel tanks, the maximum weight of the external suspensions reaches 5,440 kg, but with an incomplete fueling, more than 9,000 kg.

The stations on the ends of the wing panels are intended for the SIDEWINDER or the MAGIC air-to-air guided missiles. Up to four guided missiles of this class (including the AIM-120A) can be also be accommodated on the outside and middle underwing stations, (including the AIM-120A). Successful launches of the SPARROW and SKYFLASH missiles were also completed during the aircraft's flight trials. Various types and caliber of bombs up to 2,000 pounds, air-to-ground guided missiles, launch units with NAR can be suspended on the inside and middle underwing stations. The F-16 aircraft is also capable of employing nuclear weapons.

**THE F-16 FIGHTER MODERNIZATION PROGRAM** According to foreign press reports, in February 1980, the U.S. Air Force began to implement an F-16 staged modernization program during its series production, receiving the name MSIP (Multinational Staged Improvement Program). It is planned to introduce such improvements in the F-16's structure and systems, which will allow future equipment and armament to be used on it that increase its combat capabilities the most.

The program's first stage is intended primarily for interior design changes, carried out for the purpose of accommodating new onboard systems and armament: reinforcing the air intake structure and underwing suspension stations, increasing the stabilizer's surface by 30 per cent and changing its design, lengthening the verticle stabilizer's root section to accommodate a breaking parachute and the AN/AIQ-165 ECM system. The stabilizer, with an increased surface, would insure the aircraft's reliable flight with increased weight and a wider range of changes for the center thrust position. F-16 aircraft with such changes were produced from November, 1981 to the summer of 1984.

In the second stage (improved fighters have been produced since 1984), it is planned to equip the aircraft with the following equipment: an improved AN/APG-68 multifunction radar, the new Delco D<sup>3</sup> computer (with a memory of 600,000 words), a weapons control computer (with a speed of operations of 500,000 operations per second and memory of 64,000 words), an information display on the windscreen and two multifunction displays. The rapid input of flight information into the aircraft's onboard systems can be accomplished immediately before take-off using a cassette, inserted into the reader, in which flight information is recalled during flight.

In the third stage, (aircraft production is planned to begin in 1987), it is planned to increase the maximum take-off weight to 17,000 kg and the flight weight to 11,500 kg with a load-factor of 9 (an aircraft with two SIDEWINDER guided missiles and a full fuel supply in the internal tanks). It is also planned to equip the fighter with the LANTIRN system, the future AIM-120 (AMRAAM) air-to-air missile, a mounting with a 30-mm cannon, and the MAVERICK air-to-ground guided missile.

The LANTIRN system equipment, accommodated in two pods attached to the air intake, allow the MAVERICK guided missile, with a television-guided head and laser-guided aerial bombs, to be used. It is planned to purchase 200 sets of this system for the F-16 aircraft. Their delivery is expected to begin during the second half of 1987. In addition, in order to increase the F-16's combat capabilities, it is planned to equip it with NAVSTAR satellite navigation system equipment and the JTIDS system, and also with equipment enabling the fighter to be used in the PLSS reconnaissance strike complex.

Aircraft undergoing the improvements of the second and third stages, received the designation F-16C (single seat) and F-16D (two-seat). The F-16 will be produced for export with first stage improvements, and upon the customers' wishes, with second and third stage improvements. Judging by foreign press materials, the expenditures for the MSIP program work is approximately 1.5 billion dollars, which is resulting in the aircraft's increased cost. Therefore, the bosses of American military business, due to the apprehension of losing part of the potential customers, intend to start producing the less expensive modified F-16CM aircraft (its cost of approximately one million dollars will be less than the cost of the F-16C) with simpler equipment and armament.

**AIRCRAFT MODIFICATIONS** Besides the series F-16A, B, C, and D, it is also planned to develop several more variants; although already worked out, several have not entered production for various reasons. In January, 1985, the U.S. Navy command awarded a contract to General Dynamics to develop the single-seat F-16N aircraft, which is designed to immitate probable enemy fighters during combat training. This aircraft is being developed on the basis of the F-16C with simplified onboard equipment; the F-110-GE-100 engine was selected for the power plant. Only the SIDEWINDER guided missile on the wing tips will be retained from the armament. In all, it is planned to order 14 F-16Ns, and in the future, four of a two-seat variant, although not having the designation [of the similar F-16D]. The initial deliveries of the F-16N are planned for April 1987.

In September, 1984, the Air Force command concluded a contract for the development of a reconnaissance variant of the F-16D, receiving the designation F-16G. It is intended as the potential replacement variant for the RF-4C reconnaissance aircraft. The firm plans to equip the F-16G with an underfuselage polyconformal pod containing reconnaissance equipment, including three aerial photo cameras (AFA) and an IR unit with near-real-time information transmission. The reconnaissance equipment will be controlled from inside the cockpit. Besides the F-16G, it is planned to install this reconnaissance pod on the new modified F-16F aircraft, the development of which also enters into the Pentagon's plans.

Considered for wide export, General Dynamics developed, in the initial order, the F-16C aircraft variant with the J79 engine which is widely used in other countries (installed on the F-4 and F-104 aircraft, having an afterburner thrust almost 30 per cent less than the F-100 engine), and designated it the F-16/79. This aircraft was developed on the basis of the F-16B prototype, in which several design changes were introduced. In particular, the air intake was modified for the J-79 engine's reduced air flow and the tail fairing was lengthened 45 cm. (The J79 is slightly longer than the F-100 engine). The aircraft's empty weight was increased more than 800 kg, and the onboard equipment simplified. According to pronouncements of the firm's specialists, the F-16\79 is considered for use primarily as an air defense fighter. The firm is offering the single-seat F-16/79A and the two-seat F-16/79B variants of the aircraft and is waiting buyers.

At the end of 1978, the U.S. Air Force selected the F-16 aircraft for evaluation in flight trials of promising technology, which could be used in the development of a new-generation fighter. The general program for accomplishing these activities received the conditional designation AFTI (Advanced Fighter Technology Integration), the integration of new technology in future fighters. One of the F-16A prototype aircraft was reequipped for the trials, receiving the corresponding program designation AFTI/F-16. The following main future technical solutions were tested on the AFTI/F-16:

-- A control system for the aircraft, aerodynamically unstable in flight, which allows high maneuver and optimum controllability characteristics to be achieved in any flight conditions. The use of the principles of the direct control of aerodynamic forces (for this two forward supplementary control surfaces are installed in addition to the standard control surfaces), the use of electronic control of all aerodynamic surfaces and the maximum computerization of onboard control systems form its basis.

-- Another system is the AMAS (Automated Manoeuvring Attack System), an automated system for attacking targets while the aircraft is maneuvering. As the Western press notes, the execution of six independent maneuvers can be accomplished on the AFTI/F-16, which cannot be completed on conventional aircraft. The control of the lifting force, a change in the pitch angle and the aircraft's verticle displacement, which are achieved using flaps and stabilizers, are such maneuvers (flight modes) in the verticle plane. The control of the side force, the anglular position of the axis and the aircraft's lateral displacement are maneuvers in the horizontal plane. These maneuvers are executed using flaperons, directional control surfaces and two

forward under-fuselage aerodynamic surfaces. It is considered, for example, that the aircraft can complete lateral displacements with 2 g-loads.

The AFTI/F-16 flight trials are held primarily at Edwards Air Force Base. In particular, it is planned to execute such assessment trials as an automatic bombing run with conventional bombs from an altitude of 60 m and the execution by the aircraft of a horizontal turn with 5 g-loads.

The demonstration F-16XL aircraft is still one of General Dynamics' initiative developments. Two prototypes were constructed; a single seat one with the F100-PW-200 engine and a two-seat version with the F11-GE-100 engine. In comparison with the F-16A aircraft, the F-16XL has the following main design features. The fuselage was lengthened 1.42 m and the wing surface increased (to 61.59 m<sup>2</sup>), which permits 82 per cent more fuel to be contained in the internal fuel tanks. The forward swept, large span wing provides a polyconformal lay-out for the suspensions (their drag in this case is approximately 60 per cent less than by using conventional multi-joint pylons). The electrical control system has a built-in monitor with a 90 seconds check duration. The mechanization includes ailerons on the outside wing sections, and elevons on the inside wing sections. The ailerons can function as elevons. Inside suspensions are located on 17 stations (29 points in all).

F-16XL aircraft trials began in 1982 at Edwards Air Force Base. By February, 1985, both prototypes had completed 661 flights with a total flight time of more than 770 hours, demonstrating, according to foreign press evidence, adequately high flight attributes. In particular, a flight was completed employing a bank with attack angles up to 30 degrees at a speed of approximately 170 km/hr with a combat load of twelve 500-pound bombs. According to the development engineers' opinions, the F-16XL aircraft's operational combat radius with a 44 per cent fuel supply in the internal tanks, and with suspension tanks is double that of the F-16C. The F-16XL aircraft (U.S. Air Force designation, F-16E) participated in competitive trials with another American fighter, the F-15E. The purpose of the trials was to adopt a dual-purpose fighter into the inventory, capable of effectively executing both air defense missions and delivering strikes against ground targets. Although the F-15E (this was officially announced by the U.S. Defense Department in 1984) emerged the winner in the competition, General Dynamics hopes to develop the F-16F on the basis of the single-seat F-16XL variant, which will have the increased combat effectiveness and survivability characteristics in combat with F-16 type targets.

The Western press notes, that the F-16 fighter was developed with regard to insuring its operational unit simplicity, the basis of which consists of the principle of replacing defective modules or units IRU (Line Replacement Units) without a subsequent system adjustment. The defective equipment is sent to air base workshops, but a large repair is completed at a rear support center (Nellis Air Force Base, Nevada), where the F-16 spare parts supply service is also located. The aircraft is equipped with an automatic malfunction detection system, which according to American experts' estimations had to insure the detection of malfunctions in the electrical equipment with a 0.95 confidence probability. The work mode switches on the control panels which operate this equipment have a "check position. Information on the nature of the detected

malfunction is represented in digital form on corresponding displays, with which elements of the mechanical systems are equipped (filters, valves, etc). The systems, not having automatic monitoring can be checked using built-in monitoring equipment using any special tester, connected to a single onboard check connector. Sixty per cent of aircraft malfunctions are detected using removable panels which insures visual inspection of 80 per cent of the onboard equipment.

The production of F-16 aircraft in the U.S. is being carried out at General Dynamics main plant at Fort Worth at an average of 10 aircraft per month. The firm's specialists consider, that the plant's production capacity will permit the production rate to be increased to 20, and with additional equipment, up to 45 aircraft per month. The U.S. Air Force also ordered more than 2,650 aircraft from the firm, and export orders exceed 500 aircraft (Israel, Egypt, Pakistan, Venezuela, South Korea, Turkey, Greece, and Thailand). In a majority of these countries, the deliveries are being carried out or have already been completed. The entry of aircraft into the South Korean Air Force is planned to begin in 1986, Turkey--in 1987, and Greece--in 1988. Judging by foreign press reports, Singapore is the first country to order the F-16/79. F-16 fighters for air forces of Denmark, Belgium, the Netherlands and Norway are being built at enterprises in Belgium and the Netherlands. With this, part of the furnished articles are delivered from the U.S. In all, it is planned to build 512 aircraft for these countries.

In developing the F-16 and setting up its full-scale production, U.S. imperialist circles have injected numerous words in Western pages, that this program clearly serves the interests of U.S. defense, primarily from the "growing Soviet threat." Even the name given to the aircraft is noble--the FIGHTING FALCON. However, the world's progressive community already had the capability to make sure of similar "nobility;" to adequately recall the pirate raids of the Israeli Air Force in F-16 aircraft on the nuclear research centers in Bagdad and on the Palestine Liberation Organization's headquarters in Tripoli. In general, the purpose of developing this aircraft by any argument is not concealed--it is one way of achieving the aggressive schemes of U.S. imperialistic circles and its allies.

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## FOREIGN MILITARY REVIEW

### AMERICAN AIRBORNE GATOR MINE-LAYING SYSTEM

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) p 44

[Article by Col S. Perov; "The American Airborne GATOR Mine-Laying System"]

[Text] Presently, judging by foreign press reports, the GATOR mine-laying system continues to be received into U.S. Air Force, Naval Aviation and Marine combat units. It is intended to be used for rapidly setting up antitank, antipersonnel or mixed mine obstacles during the delivery of strikes against the enemy's second echelon, his reserves and important targets, including airfields.

The GATOR system includes the SUU-64/B universal bomb dispenser (used in the Air Force) or the SUU-58/B (in the Navy and Marines), which is filled with BLU-91/B antitank and BLU-92/B antipersonnel mines. The standard Air Force system is designated the CBU-89/B. Its 1,000-pound caliber dispenser usually contains 72 antitank and 22 antipersonnel mines (there are also variants filled with one type of mines). The Navy and Marine system is the CBU-78/B. The number of these mines in its 500-pound assembly is 45 and 15, respectively.

The BLU-91/B antitank mine is a belly attack mine, contained in a steel cylindrical casing, on the outside of which is located a plastic prismatic covering, affording better stabilization of the ammunition while falling to the ground, and facilitating packing in the dispenser's cylindrical casing. The mine has a magnetic influence fuse which has an anti-defusing element and a self-destruct mechanism with three fixed operating periods, which are set before take-off for mining, depending on the assigned mission or the combat situation.

The BLU-92B antipersonnel mine is a fragmentation mine. Its weight and dimensions are the same as the antitank mine. It is equipped with an electronic contact fuze with eight nylon point adjuster filaments, four of which (deployed after the mine falls to the ground) are spread to the sides using small springs. The mine goes off when one of these filaments is touched by a moving person or as the result of self destruction upon the expiration of a given time of being in the armed position.



The adjustment of the mine fuze operating mode, the rate and interval of releasing the dispenser and also the time of setting off the dispenser's main fuzes are made before the mining using control instruments. The CBU-89/B anti-tank and anti-personnel mine has a filled weight of 335 kg, is 2.4 m long, and 0.39 m in diameter. The foreign press notes, that the F-4 and F-16 fighters can carry 22 and 12 such dispensers, respectively, and the A-10 ground attack aircraft and F-111 fighter-bomber up to 16. The B-52 bomber can deliver 24 dispensers on inside suspension stations.

Mining is accomplished from altitudes of 60-12,000 m at flight speeds from 370-1,300 km/hr. The dispensers are released at a specified interval (from 0.63 to 4.1 seconds), then they open. The released mines, falling to the ground, end up in the armed position. One CBU-89B dispenser can mine an area 300 x 200 m.

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## FOREIGN MILITARY REVIEW

### COMBAT TRAINING OF COMBINED NATO NAVIES IN 1985

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 45-51

[Article by Capt 1st RANK V. Khomenskiy; "Combat Training of Combined NATO Navies in 1985"]

[Text] The NATO high command views combat training as the most important component element of maintaining its armed forces in a high state of combat readiness. Having decided to exacerbate the international situation, the politico-military leadership of the Bloc is heating up the arms race; is equipping its armed forces with the latest, highly effective weapons systems and military technology; and is accomplishing very timely exercising of its troops and naval forces to conduct active aggressive combat actions both in the continental and the maritime Theaters of Military Operations. In this regard, it is believed that naval forces must be prepared to carry out both independent maritime actions on a strategic and operational scale, and supporting actions in support of ground forces and groups on the littoral areas of the European theater.

It is well known that in peacetime, naval forces remain under national subordination, save for two permanently active operational groupings: the standing NATO naval Force in the Atlantic and the standing mine force of NATO in the LaManche Strait region. Transfer of the basic units of national navies to the operational command of staffs of maritime commands in the Atlantic and Europe, created and functioning even in peacetime, is done only under conditions of worsening international conditions, or at the unexpected outbreak of war. On account of the complexity of creating combined Naval groups, capable of carrying out effective combat action in designated regions, according to earlier developed plans, operational and combat exercises of these navies are planned and realized in order that even in peace time all the issues which are linked to procedures to transfer national navies to NATO, the formation of multinational elements of strike and joint navies, their deployment into predesignated operational regions and their use in various types of combat, can be worked out.

Maritime forces of the North Atlantic bloc countries, participated, in recent years in approximately 40 NATO exercises, half of which were undertaken in the Atlantic and in the La Manche Strait area. As formerly, the forward areas were

the basic zones of the exercises, areas which abut the boundaries and territorial waters of the USSR and other countries of the Socialist camp, which correspond fully to the concept of "forward maritime area," accepted in the U.S., and testifies to their provocative nature. Judging from information in the foreign press, in the course of these exercises the following problems have been solved: the shift of naval forces from a peacetime condition to a combat one in accordance with the operative NATO warning system; the transfer of units and ships to operational command of the NATO high command, the formation of operational units and groups and their deployment into predesignated combat regions; the strengthening of the forward deployed groups in the Eastern Atlantic and in the Mediterranean from units transferred from the Western Atlantic and other TVDs; combat with enemy forces in order to gain superiority in the most important regions, demonstrating constant air and surface force support to ground forces in littoral areas of the European TVD; carrying out maritime amphibious operations in straits and narrows, creation of a mine threat and an anti-mine security for own force operations; protection of oil and gas rigs in the North and Norwegian Seas and a number of other [problems]. Actually the scale has broadened and the intensity of working out problems of defense of the sea lines of communications (SLOC) of NATO has increased, in order to guarantee the safe and regular delivery of reinforcing troops and supplies from the U.S. and Canada to Europe.

The most significant of these combat training undertakings, during which the majority of the above listed problems were worked out, was the combined NATO armed force exercise OCEAN SAFARI-85 (see illustration), which took place from August 21 to September 20, 1985, and was one of a series of annual autumn NATO maneuvers under the overall title AUTUMN FORGE-85, which encompassed the European TVD, the Atlantic basin and the waters of the European theater of war. In the estimate of foreign specialists, this was the largest exercise in the last 6 years.

In the exercise, headed by the supreme high command of NATO armed forces in the Atlantic, U.S. Armiral McDonald, more than 160 combatants and support ships took place, including the multipurpose aircraft carriers, EISENHOWER, AMERICA, and SARATOGA, the British ASW carriers, INVINCIBLE and ILLUSTRIOUS, more than 400 combat aircraft and helicopters of the Navies and Air Forces of the U.S., U.K., F.R.G, Canada, Norway, The Netherlands, Belgium, Denmark, Portugal and France; joint air defense systems of NATO in Europe, and the airborne warning and control aircraft, the E-3A AWACS.

Special attention was paid in the exercise to solving the problems of organizing the defense of SLOCs in the Eastern and Iberian Atlantic and in convoying ships from the U.S. to Europe, in gaining maritime and air superiority in the western approaches to the European TVD (especially in the forward area, belonging to the North European TVD), and to carrying out mine countermeasures in the convoy staging areas, transit routes and arrival points.

Issues of defense of the SLOCs in its fullest form were worked out during a separate exercise of joint NATO navies, UNITED EFFORT-85, which served as a preparatory phase to the exercise OCEAN SAFARI. As in earlier efforts, the basic means of defense was the creation of "defended zones of maritime



Some of the more characteristic features of the use of forces in OCEAN SAFARI-85 were: achieving superiority in the Iceland zone by carriers and ASW forces with a subsequent widening of this superiority into the northern part of the Norwegian Sea; a more active utilization of the AWACS aircraft into areas of observation over surface and air situation and transmission of target designation data to the joint surface and air forces for strike against enemy naval forces; widespread use of USAF SAC B-52s for reconnaissance and mining operations in the maritime regions; and an invitation to work out combat training problems to up to 20 French naval ships.

NATO and the U.S. commands continue to regard aircraft carrier forces as the main strike component of general purpose forces, capable of conducting a wider range of missions assigned to the Navy both in a nuclear war and in limited conflict with the use of conventional weapons.

In addition to OCEAN SAFARI-85, carrier strike forces participated in the exercise DISPLAY DETERMINATION-85 (15 Sept. to 22 Oct.), DISTANT HAMMER-85 (6-17 May) and in many others. As usual, they were part of NATO's Atlantic Naval force and of NATO's strike force in the Southern European TVD, whose task it is to destroy enemy naval forces at sea and in its bases, defend the SLOCs, furnish direct air support to groups of ground forces in littoral areas and facilitate the conduct of amphibious operations. The primary force in recent years has been a strike fleet of up to three carriers and a surface action group headed by the battleship IOWA, armed with the TOMAHAWK guided missile. The creation and practical exercising of carrier strike and surface action groups in the forward seas of the Atlantic demonstrates the urgent need that the bloc leadership shows to neutralize at the very earliest stages of action the strike forces of a potential enemy in the Barents and Norwegian Seas, to hinder their deployment into the Northeastern Atlantic and by so doing, to ensure the cycle of delivery of troops and military cargo from the U.S. and Canada to Europe.

The fundamental strike forces of NATO navies in the Southern European TVD, which included 1-2 carriers and their escorting ships, were ordered to gain maritime superiority in the central and eastern sectors of the Mediterranean, to guarantee transport of landing forces and convoys and to furnish air support to ground forces near the beaches and to amphibious forces during their landings and operations on the beaches. It has become very important to work out questions of joint operations of carrier aircraft and tactical shorebased aircraft in order to coordinate in time and place the conduct of strikes on enemy forces and shore targets.

In planning and conducting strikes against enemy surface forces, carrier air operated up to 500-600 km from the carriers. Strikes against single surface targets were conducted by groups of carrier bombers (A-7E CORSAIRS, A-6E INTRUDERS and F-18 HORNETs), with three-four planes in a group, covered by 2-3 fighters. Vectors for the strike aircraft were provided by the HAWKEYE early warning and control aircraft. When attacking groups of surface ships, the number of aircraft was increased. They were designated on the basis of enemy PVO capability and comprised, according to exercise experience, 4-12 aircraft, formed up in units. Strikes were carried out from one or several directions out of long dives, from pitching or horizontal flight paths, using anti-ship

missiles, air-dropped bombs and machine gun fire. In order to confuse the AA systems of the surface units and guide its active systems into false directions, a wide range of deceptive measures were employed, which in fact increased the probabilities of breaking through toward the targets of the strike and destroying them. Carrier air operated basically during daylight hours, completing on the average of two sorties daily.

In solving problems of SLOC defense and guaranteeing delivery of landing units and convoys, the carrier strike groups operated, as a rule, along the threat axis ahead on the heading of the defended ships, 300-500 km from them. Air defense of the convoys and the carrier strike groups was ensured by continuing to launch combat air patrol fighters, operating at 15-minute launch cycles from the carrier decks.

Upon solving the problems of attaining superiority in designated maritime regions, carrier strike forces furnished continuous air support to groups of ground forces operating in littoral districts. With the objective of increasing the operational depth for carrier aviation against shore targets in the carriers' maneuvering area, if conditions at sea were favorable, the carriers closed the coastline to 50-100 miles. In other circumstances, in particular in trying to strike second echelon and moving enemy reserve forces, aircraft were refueled in flight, which increase the tactical combat radius of carrier bombers by a factor of 1.5 to 2.

ASW forces (surface ships, nuclear and diesel submarines, ASW aircraft and carrier-based and shore-based helicopters) participated in practically all Joint NATO navy exercises and have undergone intensive combat training, aimed at solving the following basic problems: Antisubmarine warfare in ASW zones, in detached maritime regions and along transit routes of deploying submarines; SLOC defense; ASW defense of the Carrier groups, amphibious forces and convoys upon their departure, transit and in areas designated for combat.

Maneuvering ASW forces operated in company with carriers, surface strike and hunter-killer groups or independently. In the maritime and oceanic areas, covered by the SOSUS longrange acoustic surveillance system, solving these problems is done in close coordination with SOSUS. For search and tracking of enemy submarines in areas where there are no fixed systems for surveillance of the undersea situation, or in areas where the probability of detecting submarines by them is very low, ASW ships, equipped with towed TASS or TACTASS antenna systems are used.

The most active and effective ASW, according to foreign military specialists, is conducted on the Iceland ASW perimeter and in the forward ASW zone, covering the Norwegian sea and the western part of the Barents. Thus, during the JOINT MARITIME CAUSE 85/1&2 exercises, conducted twice a year, a group of ASW forces, including more than 30 ships and submarines and up to 30 land based patrol aircraft operated in the Iceland-Faeroes-Shetland Island gap. Their primary task was to break up the deployment of enemy submarines from the Norwegian Sea into the Northeast Atlantic by establishing continuous trail on them during crisis periods and destroying them at the outset of war.

ASW forces were actively drawn together to create a "defended zone of maritime communication" in the eastern approaches to Europe during the exercise OCEAN SAFARI-85 and LOCKED GATE 85, ensuring expansion of the protected zone to a width of up to 500 miles and the destruction of enemy submarines attempting to penetrate it. The complement of such forces depended upon the importance of the convoy and the degree of submarine threat. Surface ships were formed up in a hunter killer group of 3-5 ships, operating both independently using their own helicopters jointly with land-based patrol aircraft.

Landbased patrol aircraft ORION, NIMROD, ATLANTIQUE, NEPTUNE and AURORA operated along with air (2-3 aircraft) and composite (2 aircraft, one helo) hunter-killer groups or independently in broad ocean areas, conducting ASW searches, as a rule, during daylight. Flight time was 6-9 hours.

The Standing NATO Naval Force in the Atlantic plays a large and important role in solving ASW problems, having operated the entire year with 5-6 ships assigned from navies of the U.S., U.K., F.R.G., Canada, Netherlands and Portugal. ASW issues have been worked both independently and in conjunction with territorial and regional ASW forces, formed up for the period of the exercise. As noted in the foreign press, its high combat readiness, well-exercised interactions among ships of the force, during ASW drills in various regions of the Atlantic allows one to regard it as a forward echelon of ASW forces in a crisis or threat period.

The way in which amphibious forces are used demonstrates that first and foremost they are an important asset in reinforcing groups of ground forces on the Northern and Southern flanks of NATO. Therefore the politico-military leadership of NATO pays considerable attention to further build-up of its combat power. The areas of the most intensive exercising the conduct of amphibious operations were Northern Norway, and areas in the Baltic and Black Sea Straits (northwestern Turkey). During wintertime, British and Dutch marines have continued to become familiar with the arctic regions and to practice means of carrying out combat operations in the complex climate conditions of mountainous regions.

During the exercise COLD WINTER-85 (12-21 March) they practiced ensuring the transfer of a joint Anglo-Dutch landing force into the landing zone (Balsfjord, North Norway) under active opposition from submarines, surface strike groups and enemy tactical aircraft. The British Carrier ASW group (Carrier INVINCIBLE) provided cover for the landing unit along with two surface strike and hunter killer groups. The landing of the marine force was carried out by combined, multiple means on an unimproved beach using floating amphibious landing devices and helicopters. Continuous support of the landing force both during landing and in subsequent operations on the beachhead was furnished by a detachment of fire support ships, tactical aircraft and carrier air (from the carrier ILLUSTRIOUS).

During the exercise SARDINIA-85, and exercise landing from the U.S. amphibious assault ship SAIPAN, landing of reconnaissance and raiding forces for the purpose of disrupting anti-amphibious defense and air and artillery softening up of the amphibious objective area preceded the landing of the main Marine force (units of the Marines of the U.S., Italy, Spain and France). The landing

occurred in several waves. Surface hunter-killer groups, in close cooperation with landbased patrol aircraft and helicopters, performed ASW defense in the landing zone and the holding areas of the amphibious ships. Air defense cover for the landing units and amphibious ships was provided by French and Italian air defense, AA missile installations and shipborne artillery.

Amphibious operations which were planned for exercising in the DISPLAY DETERMINATION-85 and DISTANT HAMMER-85 exercises were limited in scope, and were carried out basically as a command post exercises because of the tense politico-military conditions prevailing in the region.

Combat training of mine forces was aimed at exercising operations tactics of mine operations, accomplished by means of emplacing, searching and destroying mine obstructions, and mine countermeasures for operations of aircraft carriers, ASW and amphibious forces. To their fullest, these questions were exercised at length in the exercises OCEAN SAFARI-85, BLUE HARRIER-85, NORMINEX, DAMSEL THEA, DISPLAY DETERMINATION, LOCKED GATE-85 and a number of others.

Considerable attention was paid to mine countermeasures to secure exit of ships and combatants from bases and ports using minesweeper groups and detached sweepers or helicopter-sweepers, which conducted control sweeping along the paths of the planned force deployment.

Helicopter-sweepers are used for sweeping mine obstructions, established, as a rule, near the shore at shallow depth. They tow trawls at a speed of about 15 knots, and in so doing can operate independently as well as jointly with other minesweeper and minehunters. Sweep methods have been modernized by the German TROIKA system. Tactical aviation provides air defense of the minesweeping areas.

The standing NATO mine force in the La Manch Strait zone actively participated in antimining operations during the year in the Eastern Atlantic. This force, comprising 4-6 minesweepers, was increased to 10-12 during the NATO exercise. In 1985 this force provided training for up to 20 minesweepers from the navies of Great Britain, F.R.G., The Netherlands and Belgium.

Detached surface combatants were collected alongside the regular mine force units to exercise the emplacement of mine fields. Joining them were submarines, specially equipped auxiliary ships, maritime patrol aircraft and American B-52 strategic bombers. Mines were set for the purpose of disrupting a potential enemy's commercial shipping, denying deployment of his forces from naval bases and ports, blockading the coastal zones of the Black, Mediterranean and Baltic Seas and for anti-amphibious defense of coasts and islands. Mine obstructions in the form of separate mines, mine banks and fields were strewn over several days from the outset of combat action close to the territorial waters or at the egress from bases (active mine implants) and then continuously during combat activity in case the threat arose of loss of their coastal areas or even seizure of the islands (defensive mines).

NATO's high command attributes great meaning to blockading coastal zones and narrows of the Black, Mediterranean and Baltic Seas to disrupt the deployment



of a potential enemy's naval forces into the Atlantic Ocean and Mediterranean Sea, blockading them into enclosed waters for their subsequent destruction.

Some of the most active of these exercise actions took place in the Baltic Strait zone (exercise BRIGHT HORIZON-85, BLUE HARRIER-85, BALTIC OPERATION-85), in the Gibraltar Strait (exercise LOCKED GATE-85) and in the Black Sea Strait (DISPLAY DETERMINATION-85 and others). Objectives of the blockade operations were achieved through a complex use of surface ships, submarines, Naval and Air Force aviation with widespread use of mines. In blockading the Baltic Strait zone they used also missile and torpedo boats, operating as part of strike groups in the east and western approaches to the straits. In mining the approaches to Gibraltar and the Black Sea Strait B-52 bombers of the U.S.'s SAC force were used.

In addition to these basic combat problems, which determined support for the war at sea, the exercises solved problems of organizing all types of ship and force defense, organizing reconnaissance, control, communications and interactions between different types of forces and Navies, and other forces, and carrying out search and rescue work during special operations.

Anti-air defense of the carriers was provided by its escorting ships and carrier-based fighters in coordination with landbased AA systems and forces. In this connection there was widespread use of the AWACS E3A and B as well as the HAWKEYE E2C, orbiting about 200 km from the carrier for early warning of incoming air targets. For observation and surveillance beyond the air picture, periodically ships with electronic and radiolocating systems were sent out along the threat axis which substantially increased warning time of any air attack being prepared against the carriers.

ASW protection for convoys and amphibious elements was structured along zonal principles and proposed the use of ship hunter-killer groups and sea-based ASW VIKING aircraft in the inner defense zone (150 km), and carrier ASW groups and land-based patrol aircraft in the outer zone (up to 400-500 km).

Logistic support for the ships was organized at naval bases and ports and continuously at sea on a national basis. Supply of U.S. ships under the command of the NATO Strike Fleet in the Atlantic and the NATO Strike Force in the Southern European TVD was done continuously using underway replenishment techniques.

In recent years there has been a wider use of tactical aviation to solve problems of carrying out bombing and missile strikes on ships at sea up to 600 km from shore. Aircraft based along the coast have been more actively employed in operations to destroy enemy surface ship groups and for cover of own forces until execution of the deployment in predesignated areas (especially the Norwegian Sea) of carrier strike forces. Close coordination between tactical and sea-based aviation during execution of mass joint strikes against large surface groupings at sea or against shore targets was facilitated by combined centers of joint action on the NATO High Command Staff in the responsible TVD.

In the estimation of the foreign military press, undertakings in the area of combat exercises of joint NATO navies in 1985 covered all aspects of the

employment of carrier, ASW, amphibious and mine forces in initial operations of the early period of a limited war. Their main theme, the conduct of offensive, broad ranging combat actions, is sharp evidence of the aggressive nature of combat preparedness in the U. S. and its NATO partners.

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## FOREIGN MILITARY REVIEW

### FRENCH GUIDED MISSILE DESTROYERS (DDG)

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 52-56

[Article by Capt 1st Rank Yu. Petrov; "French Guided Missile Destroyers (DDG)"]

[Text] Destroyers are one of the basic classes of warships in the French Navy, which is in NATO. These are multipurpose ships, used for executing a wide range of missions during combat operations at sea (warfare against enemy surface ships, submarines, and aircraft, both independently and in concert with surface strike and hunter-killer groups, escort forces, carriers, amphibious units, and convoys; provision of fire for support of ground troops and landing forces; defense of sea communications; conduct of patrol duties; participation in maritime blockade operations and conducting surveillance). According to the foreign press, by the middle of this year the French Navy will have 16 destroyers of which 13 will be guided missile destroyers (DDG).

The first DDGs entered the French Navy in the early 1960s. In this group were four ships of the DUPETIT THOUARS-Class, equipped with the U.S. TARTAR air defense system (taken from the SURKUF-Class destroyers). The decision to do so demonstrated an urgency to speed up introduction into the fleet of ships with AA armament. Two of them, equipped with the single MK 13 missile launcher, remain in the fleet. Also on board are the TARTAR missile RIM-24 (range of 20 km at Mach 2, maximum altitude 12,000 m, launch weight 680 kg and supply of 40 missiles.)

In this same period, design of indigenous AA missiles was begun, culminating in the development in 1967 of the MASURCA anti-air missile. Two DDGs of the SUFFREN class were armed with this missile, designed primarily for carrier protection, when they entered construction in 1967-70. Ultimately, in view of the fact that construction of new carriers was not planned, and the cost of construction and operating these destroyers was relatively high, construction of the class was terminated. In its basic elements, principles of its structural arrangements and complement of armament, the SUFFREN-class DDG is very similar to ships of the same designation in other foreign navies (elongated forecastle, combined mast-stack to shorten the length of waveflow and to guarantee favorable conditions for operating antenna systems.)

The ship's hull, divided into ten sections by watertight compartments, is equipped with roll dampers in the form of three steam fin stabilizers, lowering its amplitude up to  $\pm 5^0$ . The 3-D antennas of the DRBI 23 long range air search radar are located in a spherical fairing, 11 m in diameter, on the forward bridge. A sonar system is also installed, including a built-in DUBV 23 and a DUBV 43 with a variable depth towed antenna (depending on acoustic conditions, detection range on submarines is 5-20 km). Radar and sonar data are input to a combat control information center (CIC) "ZENIT-1" which processes the data for fire control.

Four 533-mm torpedo tubes are situated on each side in special housings below the upper deck. In the bow, aft of the forecastle break is a missile launcher with two MASURCA Mk2, mod 2 and 3 guided missiles. The first modification of the missile applies to the radar (two DRBR 51 radars located on the forward superstructure), the second has a semiactive guidance head. Missile range is 40 km, at speed of Mach 2.5, a launch weight of 2,100 kg, and an onboard supply of 48 missiles. Because of the low weight tolerance, this missile installation was not installed on subsequent DDs.

Following a brief interruption, in connection with a project design for a DDG of less displacement, and consequently with much lower construction costs, construction was started on the DDG ACONIT, the lead ship of a series. The ship entered service in 1973. The foreign press noted a series of serious shortcomings involving this ship program. The requirement not to increase displacement required the installation of a limited complement of weapons and a single-shaft propulsion system, lowering its endurance and speed to 27 knots (see Table). On the whole, they terminated construction of the ship of this series and then on the basis of ACONIT experience began a new program and built the TOURVILLE-Class DDG (three ships in a series, construction terminated in 1977). They are multipurpose ships similar in architecture to the ACONIT, but they have considerably greater displacement and more powerful weapons. The first ships of this class in the French Navy were not equipped with depth charge launchers. Beginning with the AKONIT DDG, it became characteristic for ships of this class to have a flush-deck hull with a stern cutaway for emplacement of the towed DUBV 43 hydrophone array system.

The TOURVILLE DDG has a dual-sectioned upper superstructure, a collocated mast-stack and a hangar for two helicopters with landing pad. Between the forward and after superstructures on the upper deck is a MALAFON ASW missile launcher. In 1979-81, all ships of the TOURVILLE-Class were re-equipped, and the NAVAL CORTALE anti-air missile system was installed, including an 8-missile launcher system, AA missiles, fire control radar, TV camera and Infrared systems to determine displacement angle.

Initial planning considered construction of a large number of this class ship. However, as the foreign press notes, due to complex construction and high construction costs, only three ships were built and then they shifted to a project of a more simplified DDG, the GEORGES LEYGUES-Class, which reflected modern views of the French Naval staff on the appearance of a DDG which would become the basis of their service fleet to the end of this century. In the project plan, which developed two variants (a strong ASW and a strong AAW capability in a single ship), they learned from experience in building and

operating these ships. Depending on the variant, the fundamental tasks of the DDG are ASW and air defense of the carriers. In all, they intend to build 7 ships designated for ASW and 4 for AAW. At the present time, four ships of the first variant are in the fleet and the lead ship of the second variant has been launched (it should join the fleet in 1988, Fig. 2).

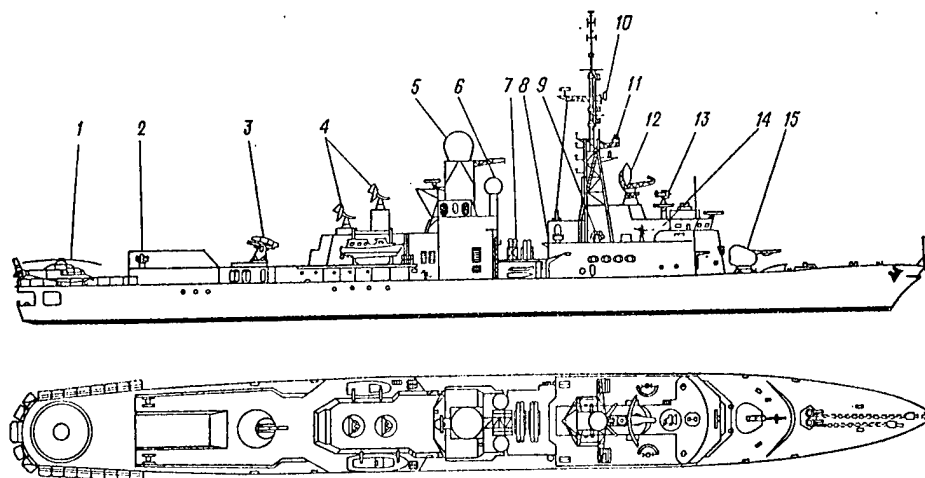


Figure 2. DDG GEORGES LEYGUES (Second modification):

1. LYNX helicopter, WG-13 or DOPHIN SA365F; 2. SADRAL air defense missile launcher; 3. TARTAR air defense missile launcher; 4. AH/SPG-51 radar antenna; 5. DRBJ 11B radar antenna; 6. Satellite communications antenna; 7. EXOCET MM-40 surface-to-surface missile launcher; 8. DAGAY EW system launcher; 9. SAGAY EW system launcher; 10. DIVB 10 VAMPIRE IR target designation system; 11. ARBR electronic reconnaissance system antenna; 12. DRBV 26 radar antenna; 13. DRBC 33 radar antenna; 14. 20-mm gun battery; 15. 100-mm gun battery.

According the program, GEORGES LEYGUES is a completely steel hulled ship, divided by watertight compartments into 17 segments, fore-and-aft framing, webbed frames and a dual-sectioned steel superstructure. The latter, however, is not considered as part of the ship's longitudinal integrity. For a considerable portion of its length, the hull has a double bottom.

The ship's ventilation system, equipped with filters, is a supercharged system of internal compartmentation, water screen and a deactivation position. The particulars of the hull show several unusual stern designs, with a large stern counter and a small cruiser stern. The full length of the waterline is maintained almost to the very stern, turning into a side V-shaped stern feature. Such a shape favorably affects its seakeeping qualities. The absence of a submerged stern decreases to a certain degree the wetted surface, thanks to which hydrodynamic resistance at low and moderate speeds is reduced. The bulbous bow with its sonar transducer does not extend beyond the limits of the stempost.

The DD has a rather low freeboard, there is a slight curve in its bow section (up to  $-5^0$ ), there is an upper deck and a stern recess for installation of the

towed sonar array equipment. As in the majority of European ships, the interdeck height is about 2.6 m in contrast to U.S. Navy ships where it is 2.9 m. Direct transit for the length of the ship is arranged on the 2nd deck, except for the area of the smoke-stack installation, where it zigs to the port side. The Combat Information Center directly abuts the pilot bridge, which from the Falkland Islands conflict experience, is considered essentially unsatisfactory, reducing its survivability. Owing to the large size of the towed antenna array, the helo landing pad is less displaced in the stern as in DDs of other classes.

In contrast to the first ships of the class, in the latter ones, the pilot bridge is located higher and is displaced somewhat toward the stern, so as to avoid overflowing from waves. The program was designed taking into account modern requirements for stability under attack. Hull architecture, integrity, speed and endurance were considered under normal displacement, which presupposed the presence on the ship of half its expendable supplies.

According to habitability standards, the arrangements for the crew differ to a better degree from that in other ships, including the U.S. Navy. Enlisted personnel have 3-tiered bunks, in 9 to 18-person compartments, separated by partitions from the adjoining ones for comfort; petty officers are in 2-tiered bunks in 2 to 12-man compartments or cabins; and officers live in 1 to 4-man cabins. Living and administrative spaces have also been increased.

GEORGES LEYGUES DDGs are equipped with active roll dampers, in the form of two side control rudders and a pair of side keels.

Ships of the first and second variant (except for their armament inventory) differ from each other in the basic type of power plant used and in the superstructure (made of aluminum alloy and therefore of less weight). On ships with greater ASW capability, in contrast with accepted practice in French shipbuilding to equip destroyers with steam turbine power plants, a combination diesel-gas turbine is used with two OLYMPUS TM3B gas turbines of 21,000 horsepower each for full speed, and two SEMT 16PA6 CV280, cruising diesels of 500 hp each, operating through reduction gears with two variable pitch propellers. In the electrical plant, there are four diesel-generators of 850 KW each. A single stage turbine at full power has a 28 per cent thermal efficiency and a half speed, 23.2 per cent. A gas generator has a 5-stage low pressure compressor and a 7-stage high pressure one, two single stage turbines and a combustion chamber with 8 sprayer jets. The gas turbine installation appears on the ship as a single module, consisting of a gas generator, its intake and exhaust, power turbine with gas diffusing nozzles and casings. Each module is installed on shockproof supports and shock-absorber mountings.

The power plant is installed in 4 compartments: in the first and third there are two diesel generators and auxiliary machinery in each; in the second, gas turbines and the reduction gears, and in the fourth, the diesels and their reduction gears.

Concerning the 2nd variant DDGs, a decision was made, unexpected according to the foreign press, to equip them with diesel propulsion plants. This is explained by the fact that the air induction and the gas exhaust structures

did not appear compatible with the weapons requirements, particularly the air defense ones. Four diesels (SEMT 18PA6 BTC, 10,650 hp each) will drive two shafts with fixed pitch propellers. It is planned to increase the diesels' power in the future to 11,900 horsepower.

The DDGs' weapons systems have a high degree of standardization according to type of system in use and are differentiated only by quantity.

On all ships, starting with the SUFFREN-Class DDG, there is installed a CIC system (ZENIT), of various modifications, the last of which (6th) includes 6 computers, and 12 display consoles with two command posts.

The GEORGES LEYGUES (2nd variation) ships will be armed with the TARTAR SAM and the STANDARD-1 SAM systems, with semi-active radar guidance systems (range, over 32 km; speed, Mach 2; launch weight, 635 kg; total weapon supply, 40 missiles) and the MK 13 launch system, which they plan to take from the DUPETIT THOUARS-Class DDGs which are gradually being put into the Reserve Fleet. In addition, it is planned to arm them with the SARDAL self-defense SAM and the MISTRAL SAM which has infrared guidance and a rapid re-load capability, assuring target acquisition at altitudes up to 3 m. GEORGES LEYGUES-class DDGs (1st variant) have installed the NAVAL CROTALE SAM with dual radar and infrared homing (range, 10 km, speed, Mach 2, launch weight, 80 kg and reaction time under optimal conditions 6 seconds).

All programmed ships will be equipped with the EXOCET anti-ship missile with its dual guidance systems (inertial and active radar) and subsonic speed. There are two modifications of this missile: the MM-38 (launch weight, 735 kg, range, 42 km) and the MM-40 (850 kg, 70 km).

All DDGs will have a universal single-mount 100-mm Mod 68 gun battery, (range, 17 km, vertical range, up to 8,000 m in altitude and firing rate of 60 rds/min. It is possible that ships now under construction could be equipped with the new 100-mm COMPACT gun battery which weighs 17 tons and can fire up to 90 rds/min.

ASW missile weapons on several of the programmed ships (see table) are the MALAFON ASW missile complex (a single launcher, launch weight of 1500 kg, range of 13 km, radio guided when in flight). The ASW missile warhead is an L4 torpedo (acoustic homing with a 30-knot speed). Among the deficiencies, according to French experts, precluding its widespread use, are its large dimensions and weight, as well as the single launcher system.

Each of the ships has 2-4 internally-installed 533-mm torpedo tubes, which fire the L5 ASW torpedo (35-knot speed), with a programmed guidance (Mod 1) or acoustic homing (Mod 4).

The armament of the TOURVILLE-and GEORGE LEYGUES-Class DDGs includes one or two LYNX Mk2 helicopters with a speed of 230 km/hr and a flight range of 590 km; a takeoff weight of 4,760 kg, and 324-mm torpedos (two each) MK 46 with active/passive sonar guidance systems (speed, 45 knots, range, 8 km, weight, 230-257 kg).

Basic Characteristics of French DDGs

Class ship # in fleet (side #s) year of entry into fleet	Displace- ment (tons) Standard Full	Basic Dimensions Length Beam Draft (m)	Power Plant horsepower	Speed Full Cruise	Missiles	Armament Guns	ASW Weapons
DUPETIT THOUARS 2 (D625, 630) 1956,57	2750 3740	128.6 12.7 6.3	Steam Tur- bine 63,000	32 18	SAM "Tar- tar" 1X1	57-mm 3X2	550-mm torpedo 2X3 375-mm depth bomb 1X6
DUPLEIX 1 (D633) 1957	2800 3900	132.8 12.7 6.3	Steam Tur- bine 63,000	32 18	ASCM "Exo- cet" 4X1	100-mm 1X1	533-mm torpedo LYNX helo 1
SUFFREN -2 (D602,D603) 1967, 1970	5090 6090	157.6 15.5 6.1	Steam tur- bine 72,500	34 18	ASCM "Exocet" 4X1 SAM "Masurca" 1X2	100-mm 2X1 20-mm 4X1	ASW missile "Mal- afon" 1X1 533-mm torpedo 4X1
AKONIT - 1 (D609) 1973	3500 3900	127.0 13.4 5.8	Steam tur- bine 28,650	27 18	"Exocet" 2 X 4	100-mm 2 X 1	"Malafon" 1 X 1 533-mm torpedo 2 X 1
TOURVILLE - 3 (D610-612) 1974-1977	4580 5745	152.8 15.3 5.7	Steam tur- bine 54,000	31 18	"Exocet" 6 X 1 "Naval Cro- tale" SAM 1X8	100-mm 1X1 20-mm 2 X 1	"Malafon" 1X1 533-mm torpedo 2X1 1 LYNX helo
GEORGES LEYGUES 4 (D640-643) 1st Variant 1979-84	3830 4170	139.0 14.0 5.7	Diesel-Gas Turbine 52,000	30 18	"Exocet" 4X1 "Naval Cro- tale" 1X8	100-mm 1X1 20-mm 2X1	533-mm torpedo 2 LYNX helos
GEORGES LEYGUES 0 (2nd variant) 1988-1994	. 4340	139.0 14.0 5.7	Diesel 42,600	30 17	"Exocet" 2X4 SAM "Tartar" SAM "Stan- dard-1" 1X1 SAM "Sardal" SAM "Mistral" 2 X 6	100-mm 1X1 20-mm 2X1	533-mm torpedo 2X1 1 LYNX Mk2 Helo

The sonar system of all the programmed ships, with the exception of the 2nd variant of the GEORGES LEYGUES-Class, includes the DUBV 23 and the DUBV 43 with a towed array, which can be operated at speeds up to 24 knots. The latter ships will be equipped with the DUBA 25 sonar system with its antenna in a bow fairing. The 1st variant GEORGES LEYGUES ships, beginning with the 5th in the series, will be equipped with the new FLUTE system (instead of the DUBV 43), with a towed linear array.

Radio electronic equipment on the DDGs includes 5-7 radars of various designations, the best of which, according to military specialists, is the new DRBI-23, phased antenna array on SUFFREN-Class ships; DRBV 51 surface and DRBV 26 air search radars (the latter's detection range is 280 km); navigation, DECCA 1226 and 1229; and gunfire control radars, DRBC 32A, B, D and DRBC 33.

Communications intelligence equipment on the ships described above includes the ARER 17, the ARBB33 jamming station, an 8-barrel chaff and infrared decoy launcher (on earlier ships) and on newer ones, ten-box and ten-barrel launchers DAGAY and SARAY (short and long range respectively).



Ships under construction in the GEORGES LEYGUES-Class will be equipped with a DIBV 10 VAMPIRE infrared data link system. All ships equipped with such radio communications operate on standard French Navy frequencies.

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## FOREIGN MILITARY REVIEW

### BRITISH OSBORN ACOUSTIC SWEEP

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 58-59

[Article by Capt 3rd Rank A. Kolpakov; "The British OSBORN Acoustic Sweep"]

[Text] Development of mines and mine weapons overseas is being carried on simultaneously with development of new, more modern means of countering them. One such means is a non-contact sweep gear, in particular the OSBORN acoustic sweep, which is included in the armament of anti-mine ships of the Royal Navy. It is designed for destruction of non contact mines, which are equipped with wideband acoustic fuzes, at depths up to 60 m.

The system of sweeping with such gear as shown in the foreign military press is demonstrated in the following manner (Fig. 1). An acoustic transducer, creating the ship's noises, is released from the stern of the minesweeper on a towed cable with automatic control instruments located on board the minesweeper, allowing the regulation of the level of radiated noise. Frequency and power of the generated oscillation is controlled through one or several hydrophones, towed at designated distances from the bottom by a paravane, and by an acoustic transmission system located within it. For combined magneto-acoustic sweeping, an echosounder and a magnetron can be installed in it. The paravane has moveable horizontal rudders, the angle of which can be changed by depth instrumentation, installed internally. Echo sounder information is transmitted to the depth instruments. The latter automatically controls the paravane's horizontal planes so that it is constantly at an assigned depth from the bottom.

The trawl (sweep) is towed at speeds up to 18 knots with tow-cable tension of 9 tons. In this case, the trawl's transducer stand off the sweeper's stern out to 400 m, and the hydrophone to 100 m. The width of the swept zone depends on regional conditions and the characteristics of the mines' acoustic fuzes.

The sound signal, arriving at the hydrophone under such conditions, is identical to the signal received by the acoustic fuze of a mine, which is located very close to the hydrophone (see mine #1 in Fig. 1). The signal is transmitted from the hydrophone along the cable to the minesweeper, where it is evaluated and, from the data received, the level of radiated noise is corrected to such strength so as not to provoke the activation of the acoustic

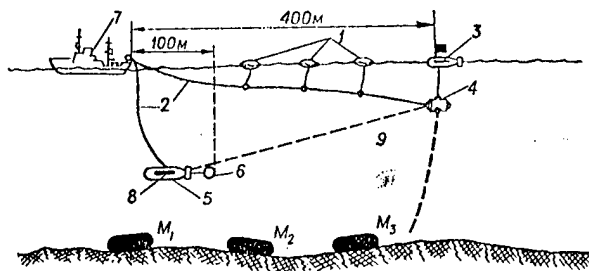


Figure 1. Schematic for Towing the OSBORN Acoustic Sweep

1. Flotation buoys; 2. Tow cable; 3. Marker buoy; 4. Transducer; 5. Paravane; 6. Hydrophone; 7. Minehunter/sweeper; 8. Paravane horizontal rudders (planes); 9. Transducer coverage sector.

fuzes in mines #1 or #2, but acts only against mine #3 which is closest to the transducer. The explosion of mine #3 cannot cause any damage to the minesweeper as it is outside the limits of the ship's danger zone.

According to material in the foreign press, the radiated noise level is adjusted by a signal transmitted via a hydrophone on the minesweeper and can be done in any of three ways,

FIRST, the level of radiated noise of the sweep, reflected at the output of a measuring device located on board the minesweeper, as it passes through an assigned threshold strength, is decreased manually, so as not to activate the acoustic fuzes of mines located within the ship's danger zones.

SECOND, control of the radiated noise level is accomplished automatically by switching on a diode to the threshold target at the input of a measuring device. When the noise level nears the threshold, the diode becomes a conductor and a resulting signal is sent to the control system; and the transducer level is decreased to a strength, posing no danger to the minesweeper.

THIRD, a servo system is used, automatically measuring the transducer level and maintaining it constantly at an assigned distance from the sweeper's transducer relative to the bottom.

The Osborn sweep equipment permits juxtaposition of known acoustic characteristics of enemy mine fuzes and characteristics of the sweep's transducer. A special computer determines the necessary transducer frequency to activate a mine's exploder.

During steady state sweeping according to signals received from a hydrophone, one can measure the depth of the submerged transducer and its range from the sweeper's stern. Signals from a hydrophone can also supply the electronic systems imitating the acoustic exploders of mines of various types. Decoys at

assigned distances between the sweep's transducer and the hydrophone permits the calculation of the probability of failing to sweep mines with assigned characteristics of acoustic fuzes.

OSBORN ensures the safety of the ship because it can establish the sweep's transducer signal strength such that it will not activate the acoustic exploders of mines in the danger zones of the minesweeper, regardless of the conditions of propagation of acoustic waves in the region of mine countermeasures activity.

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## FOREIGN MILITARY REVIEW

### DRAFT FY-87 U.S. DEFENSE BUDGET

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 61-68

[Article by Lt Col V. Efremov; Lt Col N. Makarov; "Draft FY-87 U.S. Defense Budget"]

[Text] The Soviet Union, together with the other socialist countries, persistently is struggling for consistent progress along the path for ensuring universal peace and the creation of the all-embracing system of international security set forth in the CPSU Central Committee's political report to the 27th Congress of the Communist Party of the Soviet Union. The U.S. ruling circles responded to the USSR's specific proposals, directed at reducing the military danger, with unceasing attempts to upset the balance of forces which have been formed in the world, for the purpose of achieving military superiority over the Soviet Union, and to create the basis for realizing its own hegemonic plans.

The Reagan administration's accession to power in 1981 marked the beginning of a significant expansion of the scale of militaristic preparations aimed at strengthening the military power of the United States. Thus, during the period 1981-1985, the financial resources, earmarked for military purposes, increased by a factor of 1.6. The excess rate of growth of military expenditures over the rate of growth of economic indices made for a further increase of the level of the militarization of the economy: for the indicated period, the proportion of military expenditures in the gross national product reached 6.4 per cent (earlier it had comprised 5.3 per cent). The growth of military appropriations led to a significant increase of the deficit of the state budget, from 78.9 billion dollars in 1981 to 212.3 billion in 1985. The national debt this past year comprised 1.8 trillion dollars.

The FY-87 draft budget (beginning 1 October 1986), as in previous budgets, is evidence of the strivings of the American administration and from this time on to carry out a policy directed at exacerbating the arms race, violating the military-strategic parity which had been achieved in the world.

For FY-87, the official U.S. military budget (the so-called federal "National Defense" program) was planned by the administration to be 320.3 billion dollars, which exceeds by 11.9 per cent the level of this year. Its

significant growth is assumed in the future. As appears from the draft budget, in FY-91, the appropriations for military purposes will exceed 400 billion dollars, and, on the whole, for the five-year period 1987-1991 it will comprise 1.8 trillion.

The principal part of the official military budget (more than 97 per cent) is earmarked directly for the Pentagon. According to foreign press information, the U.S. Defense Department for FY-87, asked for appropriations in the amount of 311.6 billion dollars, that is 33.2 billion (11.9 per cent) more than in the current year. (1)

Additionally, significant financial resources were earmarked for military purposes in the line items of civilian ministries and departments. Thus, it is planned to direct 8.2 billion for the Department of Energy's military programs (approximately 80 per cent of the total requested for that department). An appropriation of 4.7 billion dollars is being contemplated for the development and production of nuclear weapons, including warheads for medium range intercontinental ballistic missiles and cruise missiles, and also nuclear aviation bombs and various types of artillery shells. Large sums are being asked for the production of nuclear materials and the burial of nuclear wastes (2.8 billion), and for the development of naval nuclear reactors (0.6 billion).

An important significance is being attached to the improvement of civil defense and to ensuring the U.S. economy is mobilized in preparation for war. In 1987, 304 million dollars is projected to the federal government for these purposes for operations under emergency conditions.

The work of the National Aeronautics and Space Administration (NASA) has a military orientation. This organization's budget in 1987 is officially included in the federal "General Science, Space and Technology" Program, planned at 7.7 billion dollars. A significant part of these resources is expected to be directed at developing, testing and completing multipurpose space systems, including a piloted reusable SHUTTLE space ship. The latter's flights, conducted primarily in support of the Defense Department, are right now temporarily terminated because of the CHALLENGER catastrophe and the death of its crew. As announced by a Pentagon representative, the Defense Department is planning to use reusable space vehicles for tests in near space for anti missile technology within the framework of the so-called "Strategic Defense Initiatives" (SDI).

The precise conception concerning the main direction of development of the armed forces and the priorities in their financing are given by the information being published in the foreign press concerning the distribution of the defense departments resources being earmarked for the BASIC PROGRAMS (Table 1). From these it is clear that the Reagan administration is continuing a program of building up the combat strength of its strategic forces in all components of the nuclear "Triad." In the "Strategic Forces" program in 1987, 25.4 billion dollars are asked for, that is, 8.2 per cent of the Defense Department's budget. It is more than twice the 1981 level, when their modernization program was begun. These resources are intended primarily for the purchase of 21 MX ICBM's (1.5 billion), the construction of the 14th OHIO-

Class nuclear missile submarine (1.5 billion), modernization of the KC-135A tanker aircraft, etc. The Western press notes that, in 1986, the U.S. Department of the Air Force concluded financial programs for the purchase of the B-1B strategic bomber, which is bound to become the primary member of U.S. strategic aviation. However, even now, within the framework of one of the Pentagon's secret programs, resources are being ear-marked for the development in the STEALTH Program of a still more completely new-in-principle strategic bomber.

Table 1

DISTRIBUTION OF U.S. DEFENSE DEPARTMENT BUDGET APPROPRIATIONS  
FOR PRINCIPAL PROGRAMS (IN BILLIONS OF DOLLARS)

PRINCIPAL PROGRAMS	FISCAL YEARS		
	1985 (ACTUAL)	1986 (ESTIMATED)	1987 (DRAFT)
Strategic Forces	27,4	24,8	25,4
General Purpose Forces	118,4	109,8	128,6
Research and Development*	24,4	26,2	32,5
Forces for Transporting Troops by Air and Sea	8,7	8,1	7,5
Military Reconnaissance, Development of Systems for Communications, Surveillance, Command and Control	25,1	25,9	29,5
Reserve Armed Forces (including the National Guard)	15,8	15,8	17,9
Centralized Rear Services and Armament Repair	26,7	23,3	26,4
Personnel Training, Medical Service and Material-Technical Support	33,6	36,9	37,0
Administrative and Control Functions	6,1	7,1	6,0
Military Aid to Other Countries	0,8	0,5	0,8
Total . . . .	286,8	278,4	311,6

\* Including RTD&E for weapon systems approved for production.

Side by side with the offensive components of the strategic forces, great importance is being given to the further improvement of strategic command, control, communications and intelligence systems which are being developed on the basis of the newest achievements of science and technology.

The financing of the GENERAL PURPOSE FORCES Programs is being conducted with high tempo. In 1987, it is intended to allocate 128.6 billion dollars for it (41.3 per cent of the Defense Department's budget), which exceeds by 15.5 per cent this year's level. These resources are being directed at the maintenance and technical outfitting of the armed forces branches.

According to American press data, the share of the RESEARCH AND DEVELOPMENT programs increases each year through the distribution of the Defense

Department's financial resources among the principal programs. For 1987, 32.5 billion dollars, that is, 24.0 per cent more than for 1986, have been requested for RTD&E. During the period 1984 through 1987, this program's share has grown from 8.3 to 10.4 per cent. The resources earmarked will be used for the development of the MX ICBM (0.3 billion dollars) and the MIDGETMAN (1.4 billion), and also for the submarine-based TRIDENT-2 ballistic missiles (1.6 billion).

Active work on the realization of the "Star Wars" program has been going on since 1984. Within its framework a system of anti-missile defense, with space-based elements, has been developed. In 1987, it will become the largest item in the Defense Department's budget: 4.8 billion dollars is being allocated to it, that is, 1.7 times more than in 1986.

The U.S. military-political leadership, while continuing to intensify the strategic forces' and general purpose forces' combat capabilities, are working at a high tempo to develop a new fighter and military-transport aircraft for the air forces, helicopters for the ground forces, multipurpose nuclear submarines, advanced air-to-air type missiles, and many other weapon systems.

A substantial increase is envisioned in 1987 for each of the following basic programs (in percentages): MILITARY AID TO OTHER COUNTRIES (60.0), MILITARY RECONNAISSANCE and the DEVELOPMENT OF SYSTEMS OF COMMUNICATIONS, SURVEILLANCE, COMMAND AND CONTROL (13.9), ARMED FORCES RESERVES (13.3), CENTRALIZED REAR SUPPLY AND ARMAMENT REPAIR (13.3).

The FUNCTIONAL STRUCTURE of the Defense Department's budget, as noted in the foreign press, also is evidence of the striving to increase the combat capabilities of the U.S. armed forces (Table 2). Especially clear is the high growth rate, expressed in the recent preservation of resources earmarked for RTD&E. In 1987, the appropriations for these purposes will be increased by 24.4 per cent and will reach 42.0 billion dollars. As in previous years, financial resources which will grow at the highest rate are for putting advanced developments into effect. More than 70 per cent of these are for executing the SDI program. In 1987, they will exceed by nearly eight times the level of appropriations in 1983, that is, before the beginning of the large-scale expansion of this work.

The largest part of the appropriations, being requested by the administration for conducting RTD&E, is intended for the air force, 41 per cent, while the navy will get 26 per cent and the ground forces, 12.1 per cent.

The main part of the Defense Department's budget (more than 30 per cent) comprises resources for the PURCHASE OF WEAPONS AND MILITARY EQUIPMENT. In 1987, 95.8 billion dollars will be earmarked for these purposes. As before, it is planned to direct an enormous sum primarily for the purchase of aviation equipment (more than 30.7 billion dollars) and missiles (roughly 17 billion).

The distribution of the Defense Department's appropriations among the BRANCHES OF THE ARMED FORCES indicates not only a given armed forces branch's share in the Defense Department budget, but also the main direction of financing within them (Table 3). As in previous years, the air force is allotted the largest



Table 2

DISTRIBUTION OF U.S. DEFENSE DEPARTMENT BUDGET APPROPRIATIONS  
BY PROGRAM DESIGNATION (IN BILLIONS OF DOLLARS)

BUDGET LINE ITEMS	FISCAL YEARS		
	1985 (ACTUAL)	1986 (ESTIMATED)	1987 (DRAFT)
Combat Training, Personnel Support, Operation and Repair of Weapons and Combat Equipment, etc.	150,3	144,0	163,7
Purchases of Weapons and Combat Equipment	96,8	92,6	95,8
RTD&E	31,3	33,7	42,0
Military Construction and Housing	8,4	8,1	10,1
Total	286,8	278,4	311,6

part of the appropriations for a military department. In 1987, it will receive 33.8 per cent, comprising 105.2 billion dollars, exceeding this year's level by 11.4 per cent. The greatest proportion of the air force's appropriation is stipulated for a massive modernization program, in accordance with it there will be developed and produced such strategic weapon systems as the MX ICBM, MIDGETMAN, new generations of cruise missiles, the B-1B strategic bomber and the STEALTH program, which is being developed. Modernization of the MINUTEMEN-2 and 3, and various modifications of the B-52 strategic bomber will be carried out. A program for the production of tactical weapon systems (mainly aviation) will be realized.

Table 3

DISTRIBUTION OF U.S. DEFENSE DEPARTMENT BUDGET APPROPRIATIONS  
BY ARMED SERVICE BRANCHES (IN BILLIONS OF DOLLARS)

ARMED FORCES BRANCHES	FISCAL YEARS		
	1985 (ACTUAL)	1986 (ESTIMATED)	1987 (DRAFT)
Ground Forces	74,3	72,4	81,5
Air Forces	99,4	94,4	105,2
Navy	99,0	94,7	104,5
Defense Department Directorates and Agencies	14,1	16,9	20,4
Total	286,8	278,4	311,6

The navy's share of the budget will be 104.5 billion dollars, which is 10.3 per cent higher than this year's.

It is planned to allocate 81.5 billion dollars to the ground forces. This exceeds by 12.7 per cent the army's 1986 budget.

According to American press information, the air force will receive 39 billion dollars in 1987 for the purchase of armament (Table 4). The air force's share of the budget for this purpose is 37 per cent. The main item of expenditure is the acquisition of aviation equipment, 19 billion dollars, that is, more than half the resources for purchases. The programs for the production of tactical aviation aircraft will continue to be financed by these appropriations. In 1987, the air force is planning to purchase 48 F-15A EAGLE (2 billion dollars) and 216 F-16A FIGHTING FALCON tactical fighters (3.8 billion), the production of which will be carried out in subsequent years. To improve the capabilities of military-transport aviation, it is planned to acquire 21 C-5B aircraft (1.9 billion dollars), 8 KC-10A tanker aircraft (104 million), and expanding the production of C-17 aircraft (217.3 million). Purchases of TR-1 reconnaissance aircraft will be continued, for which it is planned to allocate 100.3 million dollars. Besides acquiring new aircraft, the air force will carry out modifications of aviation equipment, presently in inventory, for which 3.1 billion dollars is being projected.

Table 4

DISTRIBUTION OF U.S. DEFENSE DEPARTMENT BUDGET APPROPRIATIONS  
FOR WEAPONS AND COMBAT EQUIPMENT BY ARMED SERVICE BRANCHES  
(IN BILLIONS OF DOLLARS)

ARMED FORCES BRANCHES	FISCAL YEARS		
	1985 (ACTUAL)	1986 (ESTIMATED)	1987 (DRAFT)
Ground Forces . . . . .	19.4	18.0	18.6
Air Forces . . . . .	41.8	38.1	39.0
Navy . . . . .	34.0	33.8	36.6
Defense Department Directorates and Agencies	1.6	2.7	1.6
Total . . . . .	96.8	92.6	95.8

It is planned to earmark 9 billion dollars for the purchase of missile and space equipment for the air force. The MX strategic missile occupies a special place among these programs (1.5 billion dollars is being appropriated for the acquisition of 21 units). For the whole program, 223 MX missiles will be purchased of which 100 will be placed in combat positions. The cost of developing such a missile system will be approximately 21.6 billion dollars. In 1987, 105.6 million will be spent to modernize the MINUTEMEN-2 and -3 ICBM's in order to extend their service life.

At the present time, there are various types of guided missiles in combat aircrafts' combat arsenal. In 1987, it is intended to earmark resources for the purchase of 4,700 MAVERICK air-to-ground guided missiles (586.6 million dollars), 260 AMRAAM (AIM-120) medium-range air-to-air guided missiles (756.8

million), 2,130 HARM anti-radiation missiles (505.3 million), 1,710 SIDEWINDER guided missiles (96.1 million), and 379 SPARROW guided missiles (64.9 million dollars, both are air-to-air missiles). Also, 76 land-based cruise missiles will be purchased (141.4 million dollars). Part of the resources allotted for missile and space equipment is intended for the acquisition, for the air force, of two satellites for the DSCS (Defense Satellite Communications System, 122.6 million), eight NAVSTAR navigation system satellites (129.7 million), and also for realizing covered programs.

The air force is being allocated more than 40 per cent of the total defense department R&D program resources for RTD&E. In 1987, it is planned to direct 17.3 billion dollars to them (Table 5), which exceeds by 33.3 per cent the current year's level. The main part of these appropriations will be going to finance strategic programs (7.1 billion dollars), within the framework of which the small-size MIDGETMAN ICBM will be developed (1.4 billion), the B-1B strategic bomber (118.7 million), the advanced STEALTH bomber, and the SREM-2 air-to-ground missile (164.7 million), a new generation of air-launched cruise missiles, the defense department's MILSTAR space communications system (792 million), and an anti-space defense system (278 million). Within the framework of the tactical programs, development will be carried out for the advanced tactical fighter which at the end of the 1990s must replace the F-15 and F-16 tactical fighters (294 million dollars), and the C-17 military transport aircraft (612.3 million). For the development of JSTARS program equipment, it is planned to allot 355.7 million dollars, and for onboard aviation electronic systems, 137.2 million.

Table 5

DISTRIBUTION OF U.S. DEFENSE DEPARTMENT BUDGET APPROPRIATIONS  
FOR RTD&E BY ARMED SERVICE BRANCH  
(IN BILLIONS OF DOLLARS)

ARMED FORCES BRANCHES	FISCAL YEARS		
	1985 (ACTUAL)	1986 (ESTIMATED)	1987 (DRAFT)
Ground Forces	4,3	4,6	5,6
Air Forces	13,5	13,1	17,3
Navy	9,2	9,8	10,6
Defense Department Directorates and Agencies	4,3	6,4	8,5
Total . . .	31,3	33,7	42,0

In 1987, 46.0 billion dollars will be asked for air force training, material-technical maintenance and personnel support.

In 1987, it is planned to allocate 36.6 billion dollars for the acquisition of weapons and combat equipment for the naval forces. This will comprise 35 per cent of all naval resources and exceeds the current year's level by 8.1 per cent. The main thrust of the financing for this service branch is for the

purchase of aviation equipment and for ships of various classes. To equip the navy with aviation equipment in 1987, 11.3 billion dollars have been ear marked. These resources will be directed at the production of 120 F/A-18 aircraft (3.4 billion dollars), 15 carrier-based F-14A fighters (695.9 million), 42 carrier-based AV-8B VSTOL attack aircraft (761.9 million), and 11 A-6E (390.1 million).

It is also planned to purchase 9 shore-based P-3C ORION aircraft (414.2 million dollars), 12 EA-6B PROWLER AEW aircraft (450.2 million), 6 E-2C AWACS aircraft (335.3 million), and 3 E-6A communications relay aircraft (329.4 million). Significant resources are designated for equipping the navy with helicopters. The purchase of 17 sea-based SH-60B multi-purpose LAMPS MK3 systems (234.9 million), 14 CH-53E assault landing helicopters (236.6 million) and others is envisioned.

The modification of naval aviation equipment is stipulated, for which 1.4 billion dollars have been allocated, and for the purchase of reserve units, 1.9 billion.

Eleven billion dollars have been allocated for the combatant and auxiliary ship construction programs. Using these resources, 21 new ships will be constructed and 3 auxiliaries will be refitted. In accordance with the present program, 1.5 billion dollars is being ear marked for the construction of the 14th OHIO-Class SSBN (eight units have already been transferred to the navy). It is planned to build more than 20 such submarines.

The navy is also implementing a large-scale program to build LOS ANGELES-Class nuclear submarines. In 1987, it is planned to allocate 2.4 billion dollars for the construction of four of this class submarine. Resources have already been ear marked for the construction of 52 of this class submarine, of which 33 have been transferred to the navy. Appropriations have been requested for the purchase of two TICONDEROGA-Class guided missile cruisers (2.0 billion), and three BURKE-Class guided missile destroyers (2.5 billion).

In 1987, it is intended to purchase missiles to outfit aircraft and ships, specifically, 21 new TRIDENT-2 ballistic missiles for OHIO-Class SSBNs (1.4 billion), 324 TOMAHAWK cruise missiles for LOS ANGELES-Class nuclear submarines and surface ships (835.7 million), 94 HARPOON anti-ship missiles (153.8 million), 1,194 STANDARD guided missiles (747.6 million), 1,100 HARM anti-radiation guided missiles for equipping carrier-based aircraft (262.3 million), 205 PHOENIX guided missiles (321.5 million), 1,716 SPARROW guided missiles (280.4 million), 1,800 MAVERICK guided missiles (201.7 million), and 627 SIDEWINDER guided missiles (65.2 million dollars).

To support navy RTD&E programs, 10.6 billion dollars is being requested. Approximately 60 per cent of these appropriations are being directed to the financing of such programs. Most of the resources are intended for carrying out development programs for the development of the V-22 advanced transport helicopter (386.9 million), submarine combat systems (316.6 million), design of the SSN-21 submarine (256.7 million), the MK50 guided torpedo (148.8 million), improvement of the shipboard AEGIS control system (134.9 million),

the P-14 carrier-based fighter (268.4 million) and the A-6E attack aircraft (143.3 million).

Within the strategic programs' framework, 1.6 billion dollars has been requested for continuing the development of the TRIDENT-2 submarine-based ballistic missile, and also 143.3 million for the development of a strategic communications system.

For combat training and material-technical support, and also for personnel support, 54.2 billion will be allocated.

A characteristic feature of the ground forces' budget is the significant share of the appropriations for personnel support, combat training and POL (53.8 billion, or 67 per cent of that branch's total budget).

There are 18.6 billion dollars requested for the purchase of U.S. Army weapons and combat equipment. It is planned to allocate 4.5 billion for financing the production of anti-tank equipment and artillery and infantry weapons, in particular, they will acquire 840 ABRAMS M-1 tanks (2.1 billion dollars), 870 BRADLEY M2 APCs and M3 armored reconnaissance vehicles (1.2 billion). The total production for the army will be 7,800 tanks (the cost of the total program is 20 billion dollars) and 6,900 M2 and M3 armored combat vehicles (11.3 billion).

Modernization of army aviation's helicopter fleet will continue. In 1987, it is planned to purchase for it 144 APACHE AH-60A combat helicopters (1.3 billion dollars), 78 BLACK HAWK UH-60A multi-purpose helicopters (355 million), and 48 modernized CHINOOK CH-47D transport-landing helicopters (276.6 million). Overall, 3.3 billion dollars is being earmarked for this purpose.

They intend to spend 2.4 billion dollars to equip the ground forces with missile weapons: 1 billion for the acquisition of equipment for the 12 firing sections of PATRIOT air defense batteries and 700 air defense guided missiles, 293 million dollars for 4,180 portable STINGRAY air defense batteries, 153.3 million for 1,200 TOW-2 anti-tank launchers, etc.

The ground force leadership is paying special attention to the purchase of electronic resources for reconnaissance, communications, and control. In 1987, 3.7 billion dollars has been requested for the acquisition of electronic equipment.

For conducting army RTD&E programs in 1987, it is planned to allocate 5.6 billion dollars. It is expected that 4.8 billion dollars will be directed at the development of new weapon systems for the ground forces and 0.8 billion to improve existing systems. The main programs are, the development of an army air defense system (103.9 million dollars), aircraft engines (111.3 million), field artillery ammunition (107.3 million), pilotless aircraft (97.9 million), a division air defense control system (82.1 million), and the JTACMS advanced missile system (88.2 million). For strategic programs, 279.0 million dollars has been requested.

Thus, the 1987 budget, as the budget for previous years, is evidence of the fact that the Reagan administration is adopting a course for building up both the country's nuclear missile potential and the conventional means for carrying on war.

In the Soviet government's statement of 31 May 1986, it was emphasized: "It must be clear that the Soviet government will not apathetically watch as the United States breaks the agreements achieved in the field of strategic arms limitations. The American side should have no illusions that it will be successful in achieving military advantage for itself at the expense of others' security..."

The Soviet Union will, in the future, take every measure reliably to ensure the security of the socialist commonwealth, and further, will do all that is necessary for the strengthening of international security."

1. In the draft FY-87 U.S. federal budget these appropriations are planned at the level of 313.7 billion dollars. In August of last year, they were established by Congressional resolutions to be 302.4 billion dollars. Subsequently the defense department request was reduced to 278.4 billion.

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## FOREIGN MILITARY REVIEW

### PREPARATION OF MINEFIELD BARRIERS ON FRG TERRITORY

MOSCOW ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 68-74

[Article by Col V. Vasilchenko; "Preparation of Minefield Barriers on FRG Territory"]

[Text] Bundeswehr commanders consider the employment of barriers to be one of the most important factors in influencing the course of combat. Modern mechanized minelaying and development of remote minelaying have not diminished the significance of other, traditional types of barriers with or without explosives. For example, demolition of bridges and routes of advance sections of roads or construction of antitank obstacles are very effective means of creating barriers but require a great deal of labor, time, and tie up a large number of personnel. It is believed that such barriers should be begun during peacetime as a part of theater preparation.

Certain of the traditional barriers can realistically be prepared but others can only be planned, that is, included in plans, placed on maps and located accurately on the terrain. Therefore the Bundeswehr distinguishes between advance preparation and simply planning barriers.

They turn their main attention, according to reports in the West German press, to advance preparation which includes ensuring that bridges, check points, dams, overpasses, and sections of roads and railroads are readied for demolition. This should ensure the creation of barriers while, at the same time, be easily accomplished during normal troop activities. In peacetime it isn't necessary to organize operations of sites prepared for demolition, including movement of transport.

Certain of these sites, especially bridges (crossings) and sections of highways are prepared for blocking by non-explosive methods. The nature of modern transportation construction is such (numerous embankments, cuts and multiple levels) that, with skillful use of barriers or destruction, all roads within a given region may become a zone of difficult obstacles for forces.

From a technical point of view, preparation of bridges, choke points, and dikes for demolition involves making holes and fasteners for placement and fastening of explosive charges, laying sections of detonation cord or conduits

for their emplacement, connecting charges to the detcord, equipping demolition sites with support equipment, particular ladders, scaffolds, instruments, etc.

In sufficiently large bridges with reinforced concrete spans, square cut demolition chambers are built into the spans. Steel doors or hatches with reliable locks provide access to them. The doors and hatches are located so as to prevent unauthorized access to the demolition chambers. Inside the chambers, in calculated locations, shaped charge munitions are attached by Z-shaped supporting rails under abutments. In relatively small bridges, where demolition chambers are not built into the span, external charge supports are fashioned.

Reinforced concrete bridges built earlier and metal bridges can have demolition chambers in either on-shore abutments or in intermediate piers. Preparing to cut a girder or elements of metal trestle bridges demolition locations for cuts are either actually constructed or simply designated.

Sections of roads and dams are chosen for demolition where terrain conditions prevent bypassing the obstacles and where the explosions will not damage other important objects such as pipelines or cables. During preparation for destruction of road beds (dams), several concrete shafts for placement of explosive charges up to 700 kg and attachment boxes are set off to the side. Conduits run between these for the main and reserve firing systems. The depth of the shafts are calculated and can be 5-7 m. Entrance to the shafts is provided by metal covers resembling manhole covers which are opened with a T-handle wrench. Special 25 kg. demolition blocks shaped like large disks are loaded manually using poles with hooks.

The effectiveness of such barriers may be judged by the results of exercises conducted by Bundeswehr engineer forces in the summer of 1978, which were published in the Western press. During training, a section of road on a hillside was demolished by the explosion of three 500-kg charges. The charges were placed in shafts at a depth of 6 m which were placed along the centerline of the road at distances of 6 and 8 m. After the charges were placed in the shafts they were half filled with water to better tamp the explosive for greater destructive effect. After the explosion, the three holes were united in a crater with a length of 55m, a depth of 3-5 m and a width of 14-16 m. The steepness of the slopes reached 20-40 degrees.

Such an obstacle, as shown in experiments with overcoming it, could delay movement of tank and mechanized organizations (even in the presence of graders and rollers) a minimum of 6 hours. In actual practice, in the opinion of specialists, participants in the experiment, this time could be still greater, since normal practice is to mine the sides of the damaged road and cover the obstacle with fire.

In those situations when the other important objects may be damaged by an explosion, sections of roads can be made into obstacles in other ways. For example, anti-tank obstacles with a height of 140 cm above the road surface are used. Heavy steel I-beams may be used as stakes. Prior preparation of such obstacles involves placing shafts through the road surface and stockpiling I-beams. The shafts are placed in staggered order in a minimum of two rows with



a distance between rows and shafts in the rows of 1.5 m. The girders are lowered with assistance of earth mover equipment.

Sometimes, for example in separate shore and frontier regions, as well as close to certain important objects, advance preparation of minefields is carried out. This includes planning, reconnoitering and association with a local landmark, creation and securing of supplies of mines and explosives.

Laying mines will occur during periods of heightened tensions and creation of combat-ready minefields during actual combat. Additionally, reconnaissance and discovery of possible locations for other minefields is conducted. After laying the mines during peacetime, the minefields are surrounded by wire with warning signs.

An integral part of advance preparation of demolition obstacles is the creation of developed stores of demolitions, demolition equipment, and other necessities. Judging by reports in the West German press, such stores, are surrounded and signal-restricted terrain with bunkers, arranged to the side away from population or through roads, usually in the woods, but relatively close (up to 6 km) to the barrier. One dump may serve several barriers.

Preparation of planned barriers is carried out within the guidelines of general theater operational procedures. It is planned, as a rule, jointly by NATO headquarters and the Bundeswehr. Putting together specific plans, and also control over observing the interests of the country in planning the barriers, by the allies in NATO is assigned to engineer sections and infrastructure of the staffs of the military councils of territorial forces. Practical accomplishment is mainly assigned to special organizations established in 1957, consisting of qualified specialists in fortification and barrier construction. They are made up of small groups of three to five people. This includes experienced engineer officers and non-commissioned officers who have attended a special training course in the Engineer School in Munich. Each group is responsible for a specific territory in which, on average, there are three administrative city or village areas. Certain groups (four or five) are subordinate to the headquarters of the Territorial Force Region and operates under the direct command of the engineer section.

Commanders of these groups prepare proposals on advance preparation of barriers, technically supervise the accomplishment by civilian construction organizations and accept completed barriers. Additionally, they develop combat documentation on barriers considering all possible places for them, arranging the delivery of explosives and other demolition material and military equipment to the corresponding dumps. If the barrier is located in the zone of responsibility of a Bundeswehr corps, the barrier prepared for demolition together with the stores of demolitions, engineer munitions, and combat documentation, is turned over to its engineer organization. Barriers located behind the rear boundary of a corps remain the responsibility of the headquarters of the military council of the territorial forces.

In peacetime there is documentation for each barrier, inspections, reconstruction, repair and resupply when necessary. Some of the barriers are occasionally used for combat training of army and territorial troops. Such

barriers are provided with instructional material and documentation.

The training of the summer cadre of engineer organizations and combat soldiers is also an integral part of advance preparation of barriers. The personnel, in Bundeswehr specialists' opinion, must be able to alter the degree of preparedness of mine barriers, correctly conduct and use combat documentation, be ready to accept and transfer, secure and defend barriers.

Combat employment of barriers prepared in peacetime is planned on the basis of the same principles as are those which are created during combat. In conformity with their view of the complexity of demolition, Western publications contain statements on the necessity of meeting the following demands: an order to prepare a demolition must be in written form; engineer organizations are used to prepare demolition only under conditions where they can be quickly released for subsequent tasks; security and defense of prepared demolition sites is accomplished by combat army and territorial force organizations; actual demolition is carried out only upon the direct approach of the enemy and on the command of a combat commander or his higher commander.

There are two levels of preparation for demolition sites prepared in peacetime and for demolition sites and barriers prepared in combat - No. 1 and No. 2. Judging by press reports, as regarding demolition of roads, bridges and similar objects, readiness state No. 1 means that demolition charges are placed on the objective, demolition wire or cord is laid and attached to the charges, however to prevent unauthorized detonation the detonators are usually not placed in the charges. Movement of forces across sites prepared in this fashion is not stopped and is controlled by combat organizations securing and defending them. During conversion of a site to readiness state No. 1, control of movement across it as well as security of it and transfer to combat forces is the responsibility of engineer organizations who are preparing the site for demolition.

Readiness state No. 2 means that the charges may be blown at any time. Activities required to convert a site from one level to another, for example placing detonators in charges or removing them, and activity to produce the explosions with minimal expenditure of work is carried out by teams from the combat organizations responsible for the barriers. In cases where a great amount of labor will be required or under other complicated conditions, a demolition team from the engineer organization which prepared the site is attached.

Combat documentation on barriers prepared in advance covers the order of activation in combat in calculated periods of time while observing safety rules and minimizing the expenditure of forces and time. At the same time it assigns responsibility to individuals for timely and correct accomplishment of the mission. According to reports in the West German press, the basic document for advance preparation of a mine field is a logbook, and for a demolition site it is a journal.

There is only one form of journal but, filling it in and the detail of the information in it depends on the type and complexity of the site. For example, a journal for a barrier prepared in advance for demolition on a major highway

bridge may contain the following documents: a photo of the sight and surrounding area, map with layout of nearby demolition sites, demolition and blasting equipment dumps, schematic of these dumps with entrances, roads and bunkers shown, location of fuses, blasting equipment and related equipment in the dumps; instructions on opening the dumps and demolition chambers at the site; specifications of the demolitions, blasting and related equipment, and teams of personnel and transport for transporting it from the supply point to the site; plan and cross-section of the bridge section (usually in a 1:500 scale) showing locations of placement of charges and grade; schematic of detonation station showing where the main and reserve demolition wires (cord). The journal, additionally, contains data on disposition of personnel and organizations during preparation of a site for demolition. Some of the documents contained in it are filled out on blanks which can be handed to a squad leader when assigning him a specific mission.

Important documents to be found in the journal include orders to the commander of the engineer organization which is preparing the site for demolition and to the commander of the combat organization which has taken responsibility for the site. The order (on a form) to the commander of the engineer organization (in NATO this is the chief of the demolition team) designates the times for bringing the site to the State No. 1 and for transferring the prepared site to the commander of the combat organization (designated chief of the team for demolition security), the combat unit or organization, from which this team is detached, with the stated responsibility and name of its leader, and other necessary information. Different points of the order specify that the demolition in a normal situation is executed on order of the commander of demolition security (this must be verified by his signature), and other points designate the order of executing a demolition in an emergency situation when the demolition security team has not been assigned or has not arrived. Part of the text on the form, for example the order on executing the demolition, is printed and may be filled in in three languages - German, English and French. This is as a result of a special NATO agreement on unification of documents on combat employment of barrier.

The order (also on a form) to the leader of the demolition security team contains information on the preparation of the site for demolition by the engineer organization and its commander, relevant characteristics of the site, and necessary data on the order of changing the state of preparation of the site and execution of the demolition. In particular the responsibilities of those personnel who have the right to give the command to execute and the means for giving that command.

Training for the personnel of combat and engineer organizations in the use of advance prepared barriers may include instruction in the guiding documents and the order of operations in documentation, setting up separate technical and tactical positions, and complex development of instructional materials for specialized tactical training.

Specialized tactical training, as reported in the military press, may be conducted with engineer, motorized infantry and other organizations separately or together. The tactical training scenario for employment of major barriers is for a Bundeswehr brigade while for smaller barriers, for example,

preparation for blowing a crater in a road, use a battalion tasks force. Training takes place on actual existing and prepared sites, but using training documentation, and training demolitions and blast equipment. During training the personnel work on not only such matters as correct placement of demolitions, laying detcord, security operations, etc., but also particularly the actions of commanders at all levels.

For example, in training on engineer platoon operations to prepare a bridge for demolition, particular attention should be paid to the platoon leader's activities in clarifying the mission, studying documentation of the site and on the quality of his plan of operations. It is believed that even while analyzing the mission and studying the documentation, the platoon leader should not only be able to give correct and clear instructions on tactical and technical conditions for completing the mission, but also give orders to his platoon sergeant on preparing the movement to the site, and loading and transporting demolitions from the dump. Attention must be given to the ability to fill out forms from the barrier journal with the necessary drawings and instructions.

While examining the mission and studying the documentation on the site, the commander should make a plan for preparation of the bridge for demolition with the missions assigned to detachments and teams and times for starting and completing. Upon arriving at the site and after reporting to the commander of the combat organization designated for site security (if it has arrived), the platoon leader should conduct a personal reconnaissance with him of the site and surrounding area, perfect his plans and give the platoon order to convert the site to State No. 1. Then the transfer of the barrier and its documentation to the combat organization commander is arranged, reports are made to the appropriate leaders, and the order of the attachment of a team of demolition engineers to the combat organization.

In the West German military press there is an example of specialized tactical training for an engineer platoon in the demolition of two on-shore abutments with advance preparation of a reinforced concrete highway bridge about 220 m long and 13 m wide. The plan called for using 2.1 tons of demolitions (DM19, DM29 and DM51 charges). The distance from the area where the platoon was deployed to the site was about 7 km and the route to the ammo dump and thence to the site was 11 km.

The course of events for converting the site to State No. 1 and the assignment of the personnel in accordance with the commander's plan are shown in the table.

During training with a combat subunit, it is recommended that special attention be given to working on receiving, securing the site and its subsequent destruction, and transferring (when required) the prepared site to another combat organization.

Considering the complexity of the work to be completed, the personnel of combat subunits should have good engineer training. Therefore, in the Bundeswehr, some of the officers and NCOs of combat arms take courses in the

Time table for bridge conversion

Conversion of a Bridge to Readiness State 1 by an Engineer Platoon

Order	Executor	Activity	Time of Beginning and Ending of Activity
1	Platoon leader	Receive mission	13.00
2	Platoon Sergeant, 1st and 2nd Eng Squads attached group of Engineer munitions.	Partial unloading of vehicles to make room for demolition materials.	13.15 13.45
3	Platoon leader, Platoon Sergeant, Detachment Commander.	Issue orders to take actions described in 4 and 5.	13.30 13.40
4	Platoon Sergeant, 1st & 2nd Engineer Squads, Attached Group of Eng munitions.	Receive, load and transport demolitions from dump.	13.50 14.50
5	Platoon leader, 3rd Engineer Squad.	Arrive at site and report to infantry company commander. Determine location of platoon vehicles, set up security posts, open entrances to mine chambers, check charge holders, reconnoiter detonation station, instruct demolition carriers on site and on entry to it.	14.00 15.15
6	Platoon leader, Platoon Sergeant, Detachment Commander	Give orders to convert bridge to state no. 1.	15.15 15.25
7	3 soldiers of 1st Squad	Secure site, watch for air attack	15.30 17.45
8	Remaining personnel of 1st Squad and attached group	Transport and place demolition and equipment at entrances of charge chambers, prepare detonation station, lay main and reserve demolition wires to section 1.	15.30 17.45
9	Platoon Sergeant, and 2nd Squad.	Place demolitions into section 2 charge chambers, place fuses in section 2, attach wires.	15.30 17.45
10	Platoon Sergeant and 3rd Squad	Same as order 9 for section 1.	15.30 17.45
11	Platoon leader	Control execution, establish communications with infantry company commander, complete documentation and prepare report to engineer company commander.	15.30 17.45
12	Platoon Leader	Transfer site to infantry company commander.	17.45 17.55
		Readiness state 1, according instructions.	18.00

Engineer School in Munich where they are trained as instructors in engineering. Special attention is given to use of barriers and demolitions. According to data in the FRG military press, there is a goal that each Army combat platoon leader have a certificate of combat demolition expert.

The Bundeswehr headquarters, as reported in the West German press, constantly devotes attention to advance preparation of barriers. It is attempting to create a unified system of advance preparation of minefields and barrier fields. For this purpose the Bundeswehr leadership continues to improve not only the organization, but also the technical side. Thus, according to military specialists, until recently it has been considered very difficult and labor intensive to prepare steel girder bridges and other similar constructions for demolition since existing issue charges are not well suited for placement on the metal shapes. In this connection to change explosive charges of 100, 200, 500 and 1,000 gram weight, the FRG has developed a single 1 kg charge. It is reported that this weight and shape charge was selected considering the most commonly encountered construction elements. The charges are plastique and covered on one side with a sticky substance which eliminates the necessity to use additional objects to attach it.

At the same time, work is going on to improve the issue shaped charges and to explore the possibility of supercharging powerful slabshaped hard demolitions and to evaluate the possibilities of changing the electric wiring. The overall goal of these efforts is to improve the reliability of demolishing objects with reduced preparation time.

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# FOREIGN MILITARY REVIEW

## JAPANESE NAVAL SHIPBUILDING FOR FISCAL YEAR 1986

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) pp 75-76

[Article by Capt 1st Rank Yu. Yurin; "Japanese Naval Shipbuilding for Fiscal Year 1986"]

[Text] Of the total Japanese FY-86 military budget (commencing 1 April) of 3,343.5 trillion Yen, 793.3 billion Yen (23.7 per cent) has been earmarked for the Navy, which is 8.2 per cent higher than in the previous year. The distribution of the navy budget, by line item is presented in the table.

### DISTRIBUTION OF NAVY BUDGET BY LINE ITEM

BUDGET LINE ITEM	TOTAL, BILLIONS OF YEN	CHANGES RELATIVE TO FY-85, BILLIONS OF YEN (%)
Personnel Support.....	282.7	23.8 (9.2)
Payment of subsequent expenditures for contracts concluded earlier.....	392.3	33.6 (9.4)
Conclusion of new contracts and the initial payments for them.....	118.3	2.6 (2.3)
of these:		
Shipbuilding.....	2.0	0.3 (17.6)
Aircraft construction.....	0.5	0.3 (150)
Ammunition purchases.....	1.8	0.6 (60)
POL purchases.....	26.0	-1.5 (-6.1)
Combat training.....	6.2	0.2 (3.3)
Vehicle purchases.....	5.4	-1.2 (-28)
Repair and spare parts.....	49.7	2.7 (5.7)
Facilities construction.....	7.5	0.7 (10)
Other	19.4	0.5 (2.6)
Total . . . . .	793.3	60 (8.2)

\* The subsequent expenditures for these contracts is programmed to total 455.7 billion Yen (1.3 per cent growth).

It is planned to increase the authorized number of servicemen by up to 45,551, and to keep the manning at a level of 96 per cent. It is expected that the number of civilian personnel will be reduced by up to 4,146, and the permanent reserve will remain the same (600 men).

It is planned to form Guided Missile Destroyer Division 45, Flotilla 3 (DD132 ASHAYUKI, and DD133 SHIMAYUKI), Minesweeper Divisions 17 and 18 in the 2nd and 1st Flotillas, respectively, as new ships are commissioned. Three independent divisions in the naval districts are scheduled for decommissioning, the ships of which will be transferred to the reserves (two destroyers and four minesweepers). To replace them, it is planned to reassign units to the naval district commandants from Destroyer Division 21 (Sasebo Naval District), and Minesweeper Divisions 46 and 49 (to the naval districts at Yokosuka and Sasebo, respectively). It is also planned to take the submarine UZUSHIO S566 out of reserve. The reequipping of Squadron 2 of the 2nd Air Wing at the Hatinoy air base with P-3C aircraft is envisioned.

It is planned to complete the construction of seven combatants and ships in FY-86: one submarine, three guided missile destroyers, two minesweepers, and the general-purpose stores ship, TOVADA. Additionally, the construction of 12 ships will continue: two YUSHIO-Class submarines, eight guided missile destroyers (one HATAKAZE-Class and seven DD134-Class), and two HATSUSHIMA-Class minesweepers. Also, it is planned to place orders for the construction of eight more combatants and ships: DD134-Class guided missile destroyers, a 2,400-ton submarine and two new design guided missile frigates (1,900 tons), two HATSUSHIMA-Class minesweepers, a small landing ship (420 tons), and a combat training ship (2,200 tons). Commissioning of the last 20 units is envisioned for FYs-1987-1990.

It is planned to supply naval aviation with 18 aircraft and helicopters: P-3C (7 units), U-36A (1), US-1A (1), HSS-2B (7), SH-60B (1), S-61A (1), and also to continue the construction of 29 units (18 P-3C, 10 HSS-2B, 1 S-61A). Additionally, it is envisioned placing orders for the construction of 30 aircraft and helicopters: P-3C (10 units), HSS-2B (13), MH-53E (4), US-1A (1), TC-90 (1), KM-2 (1). It is contemplated that the latter 59 units will enter naval aviation units prior to FY-1990.

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FOREIGN MILITARY REVIEW

U.S. NATIONAL GUARD 29TH LIGHT DIVISION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 86 (Signed to press 7 Aug 86) p 76

[Article by Lt Col I. Aleksandrov; "The U.S. National Guard 29th Light Division"]

[Text] At the end of 1985, the Pentagon announced the formation of the 29th Light Infantry Division in the National Guard ground forces. As noted in the foreign press, it was created on the basis of the 29th National Guard Infantry Division which was disbanded earlier by new units and subunits. The 116th (Virginia) and the 58th (Maryland) Independent Infantry Brigades became a part of it. It is planned to billet the third brigade at Fort Hill (Virginia). It is reported that an army aviation brigade (Maryland), 3 - 4 field artillery divisions (Virginia), and an intelligence and electronic warfare battalion (Maryland) will be included in its composition--the first such type of subunit in the national guard, and also a supply and service subunit.

The ground forces command plans to complete, by 1988, the division's deployment, the staff of which is located at Fort Belvoir (Virginia). The division's personnel strength is 10,768 men. Its armament will comprise the same weapons and military equipment provided the regular forces light infantry divisions, including 54 105-mm towed howitzers, 36 106.7-mm motars, 206 TOW and DRAKON anti-tank guided missile launchers, 522 M203 anti-tank rocket launchers, 18 VULCAN self-propelled air defense batteries, 90 STINGRAY portable air defense missile, (firing crews), 99 army aviation helicopters, 870 1.25-t M966 high mobility vehicles, 135 motorcycles and other armament.

The American command believes that the formation of a light infantry division upgrades, to a significant degree, the national guard's capability to reinforce the regular forces in crisis situations.

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